THE GAS JOURNAL

JUNE 1, 1932

Vol. 198 84th Year No. 3602

A Glance at the Contents—

South Suburban Gas Bill.

This Bill came up for consideration by the House of Commons on Wednesday last. [p. 538.]

Society of British Gas Industries.

A report is published of the annual general meeting and dinner of the Society held in London on Thursday last. [pp. 497 and 514.]

Institution's Sussex Tour.

We publish an illustrated account descriptive of the tour which has been arranged for members of the Institution on Friday, June 10. [p. 500.]

Manager and Secretary Required at Kirkham.

As will be seen from our advertisement columns, applications are invited by the Kirkham Gas Company, Ltd., for the post of Manager and Secretary. The commencing salary is £250, with house, coal, gas, and rates free. [p. 536.]

Gas Driven Motor Transport.

We publish an illustrated description of a gas driven motor lorry owned and equipped by the Tottenham and District Gas Company. It is running successfully on compressed gas contained in steel cylinders having remarkable properties. [p. 499.]

Long-Distance Gas Transmission.

In our columns to-day Dr. H. Lent gives an account of the remarkable progress made in the high-pressure distribution of coke oven gas in Germany. His article is illustrated by a series of photographs exemplifying the application of coke oven gas in industry. [p. 502.]

Steaming Retorts.

We publish an abstract translation of a discussion by A. Steding of the principles of steaming. The author describes methods, introduced by the Otto Company, by which the normal practice of steaming may be extended by the cracking of tar introduced into the retorts or chambers with the steam. [p. 513.]

Floods in the Rotherham District.

The effect of floods on the gas supplied by the Rotherham Corporation is the subject of an article in our "News of the Week" columns to-day. [p. 495.]

Hong Kong and China Gas Company, Ltd.

A report is published of the general meeting of this Company held in London last week. A dividend of 10 p.ct., less income-tax, was declared. [p. 530.]

Gas Lighting in Sheffield.

Useful figures relating to the gas lighting of Sheffield are contained in a paper on "The Work of a Public Lighting Department" which Mr. E. Marrison read at a recent meeting of the Illuminating Society. Out of 15,687 gas lamps in Sheffield, 12,842 are now fitted with mechanical control. [p. 497.]

South African Lighting Association, Ltd.

A dividend at the rate of 5 p.ct., less income-tax at 3s. 2½d. in the £, was declared at the Forty-Third Ordinary General Meeting of the South African Lighting Association, Ltd., held on May 25, when the Chairman (Mr. William Cash, J.P., F.C.A.) remarked that the Association's financial position was quite strong. [p. 529.]

Machines in the Office.

In his Presidential Address to the Wales and Monmouthshire Association of Gas Engineers and Managers, Mr. Ernest Ablett deals with the office organization of the Swansea Gas Light Company. As a result of experience he arrives at the conclusion that, if the Gas Industry is to progress on right lines, there must be in gas undertakings a greatly extended use of modern office machinery. [p. 521.]

Co-Partnership at Croydon.

A feature of the tenth annual meeting of the Croydon Co-Partnership Scheme was the presentation to the Chairman of the Company, Mr. William Cash, of an inscribed silver salver by the employees in appreciation of his services as Chairman of the Co-Partnership and Works Joint Committee. At the meeting fifteen co-partners received long-service awards. [p. 527.]

Forthcoming Engagements

June 6.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Council, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

June 14.—INSTITUTION OF GAS ENGINEERS.—Meeting of Joint Lighting Committee, 2.15 p.m., 28, Grosvenor Gardens, S.W. 1.

June 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

June 18.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION (AUXILIARY SECTION).—Meeting at the works of the Washington Chemical Company, Ltd.

June 23.—B.C.G.A.—Meeting of General Committee, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

June 24.—B.C.G.A.—South-Western District Conference, Dartmouth.

June 24.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.

June 29.—B.C.G.A.—Lancashire District Conference, Stockport.

July 1.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Summer Meeting at Ramsgate.

Aug. 16 and 17.—IRISH ASSOCIATION.—Meeting in Dublin.

Sept. 1.—ASSOCIATION OF STATUTORY METER INSPECTORS.—Annual Meeting in Edinburgh.

Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.

EDITORIAL NOTES

The New Coal Mines Bill

WHEN dealing in last week's " JOURNAL " with the coal situation, it was remarked that in July next a seven-hour day would again come automatically into force unless meanwhile a new Act was passed dealing with the matter. A Bill has now been introduced which provides that the quota system is to be carried on for another five years, and that the seven-and-a-half-hour day will be reduced to seven and a quarter hours if, and when, there is simultaneous ratification by all the European coal-producing countries of the Geneva Hours Convention. Wages were guaranteed at the existing level under the Act of last year, which will lapse early next month. There is, however, in the present Bill no provision for wages. In place of this, the fundamental condition on which the Bill is brought forward by the Government is that wages will be maintained for twelve months under a " gentleman's agreement " in each of the 21 colliery districts. Some of these guarantees have already been given in writing and others verbally, but it is confidently anticipated that before the Bill becomes law all the guarantees will have been obtained.

There is opposition on account of the absence of wages provisions, but as plans are for a rapid passage the situation should develop from day to day. Freedom for the industry seems to be no nearer than before.

A Fascinating Story

SINCE the commencement of the distribution of coke oven gas at high pressures in Germany our readers have been kept well informed of the progress made, and our pages have from time to time contained articles discussing both the pros and cons of large-scale centralized production and the transmission of gas long distances. Of all these articles none, we think, will prove of greater interest than a remarkable account of coke oven gas in the iron and steel industry, by Dr. H. Lent, of the Vereingte Stahl Werke, A.G., appearing in the " JOURNAL " today. Apart from the fact that the author is quite naturally all for long-distance transmission, one point from a host of others stands out clearly—that the application of science, imagination, and skilled engineering practice to gas production, distribution, and utilization is proving beyond all doubt that carbonization is the logical treatment of coal, and that gas for practically every purpose, industrial and domestic, is the most satisfactory form of refined energy. To anyone concerned with fuel technology Dr. Lent's contribution must prove fascinating; to those in the Gas Industry and the Coke Oven Industry it must be a source of gratification and inspiration, showing as it does the compelling capacity of carbonization to meet successfully changed and changing economic and industrial conditions. Gas is on the threshold of a new career of vastly enlarged usefulness.

It is not our intention here to enter into any argument as to the relative merits of centralized gas production at the mines and high-pressure transmission to distant points of utilization, and of localized, though not necessarily small-scale, gas production. Freightage costs and geographical orientation, and a hundred-and-one other factors have to be considered before arriving at any conclusion; and it is obvious enough from the paper under review that circumstances in Germany, where a dense localized coal area of high-productive capacity exists—in the Ruhr coal districts the capacity is about 180 million tons a year—differ markedly from conditions in our own country. Moreover, Germany after the war was in the peculiar position of being able to start almost *de novo* in regard to gas and coke producing plant, and able to start, too, on the basis of knowledge accumulated over several years. There is, in fact, some similarity between the coal-producing areas of Germany and the oil-producing districts of North America, where long-distance transmission of natural gas is developing apace. Comparison, therefore, between Germany and Great Britain is not valid; and one can only call attention to the point made by Dr. Lent (though he does not set out any figures) that in Germany high-pressure distribution of coke oven gas is a better proposition than localized manufacture and supply.

An Engineering Triumph

ALL will be agreed that the system in operation in Germany is a magnificent feat of engineering and a practical interpretation of an ideal—the ideal of meeting the total fuel demand of all the departments of a large steel corporation, including finishing installations, without using any coal other than that required to produce the coke. Together with this is the quantity of coke oven gas available for general industrial and domestic use. To-day the high-pressure pipelines of the Ruhr coal district amount to more than 620 miles and extend from Aachen to Hanover, and the author is at pains to explain that this is only a beginning. It is certainly a successful beginning, and the technical and economic reasons for this form the substance of Dr. Lent's remarkable paper. Of great significance are his remarks on the method of approaching the problem of high-pressure distribution—the necessary calculations for arriving at the optimum value of the gas pressure and pipeline diameter for the lowest installation and operating costs. Here we would be well advised to take a leaf out of the author's notebook, for " the factor of safety " in mainlaying in this country, even taking into consideration the need for due regard to future expansion of sales, is apt to cover easy, instead of accurate, working. And of great interest also is the author's description of the control system in operation for regulating large gas volumes, overcoming pumping difficulties, and allowing for the storage capacity of mains containing gas under pressure. New methods have had to be developed to render smooth the working of the main control room of the Ruhr Gas Corporation, a view of which is reproduced—new methods of measuring temperature, pressure, and volume, and of transmitting these measurements to the central station. An outline of these devices is given by Dr. Lent, and he also emphasizes the precautions taken to ensure complete safety of the entire system. Thus, for example, all pipelines are examined daily along their entire length; and the author concludes quite simply: " In this manner high-pressure gas distribution has been successfully carried out for the last twenty years without any interruptions or accidents in the whole network of pipelines on the Continent . . . and fuel delivery by a high-pressure gas distribution system, for municipal as well as for industrial purposes, has proved more reliable than long-distance electricity supply."

We are sure that Dr. Lent's paper will be well and profitably studied in regard to both general principles and details. As to the latter, two matters appeal for comment. One is the sulphur purification equipment installed by Lenze-Sensebrenner at the Friedrich Thyssen Colliery. Here the boxes containing the oxide of iron are arranged vertically in a tower 25 ft. in height. The author does not tell us of the success or otherwise of this installation, but in this connection our readers may recollect that a year ago, in our " Continental Notes " we dealt at some length with the dry purification towers installed in the gas-works at Hamborn and at Alsdorf. Among the advantages claimed for this system are small ground space, easy supervision, small capital cost, and

low operating and labour charges; and in the "JOURNAL" for June 3 of last year comparative costs were given for tower and box purifiers for a daily output of 63 million c.ft. of gas. Annual costs were cited of £12,200 for the tower system and £18,975 for the boxes. Clearly, then, the tower system is worthy of investigation in this country. The other point in Dr. Lent's paper—it is, perhaps, hardly a matter of detail—is the high efficiency of modern furnaces fired by gas. The author speaks in particular of furnaces utilizing gas at high pressure, and emphasizes that to-day with furnaces employing recuperation, heating efficiencies of 50 to 70 p.ct. are obtained. That the many advantages of gas as an industrial fuel are being appreciated practically in Germany is shown in unmistakable fashion by the series of photographs of gas-fired installations which we reproduce in our pages to-day—and these illustrations are only part of those thrown on the screen by Dr. Lent when he presented his paper to the Institute of Fuel a few days ago. It really is time that, as an Industry, we became less modest.

Aspects of Economy

ON the same day last week the question of national economy was discussed at two important meetings in London, and in both cases the subject was in the hands of experts. Lord Eustace Percy, M.P., who has been for two years President of the Society of British Gas Industries, devoted his address to the subject of "Economy in Social Services"—the problem which is worrying so many of us at the present time. As he develops his argument, one realizes that a reversal of existing tendencies will be as difficult as it is necessary: "The fundamental fact about the administration of a social service is that both economy and the prospect of progressive development depend on the existence of a great volume of voluntary effort, such as can only express itself in comparatively small units, in a comparatively small local area, or in a comparatively small non-local association. The moment that administration and finance become organized in units too large to enlist such voluntary effort, economy in its true sense must, to a large extent, be sacrificed, and progress will be limited, and eventually arrested, by the impossibility of raising taxation beyond a certain point. In fact, economy in its true sense consists not in an attempt to reduce the volume of social services—to educate fewer people or to build fewer houses, nor even in an attempt to spend less money on those services; but in the difference between financing those services out of taxation and financing them out of subscriptions."

Lord Eustace Percy feels that what is amiss is that we are spending necessary money through the wrong channel—the impersonal channel of Government, instead of the personal channels of voluntary effort. He would induce the country to turn from impersonality, and return to the principles of personal responsibility. This would be indeed a meritorious feat, and we would that Lord Eustace Percy and other of our vigorous young politicians could accomplish it. But we have travelled far in the other direction!

The second meeting took place in the City, and thereat a resolution demanding that the Government should inaugurate measures to greatly reduce national expenditure and taxation, and that local authorities should curtail their claims upon the Exchequer, was proposed by Sir Robert Horne, M.P., and carried unanimously. Some astounding statistics were quoted—one of the most striking, perhaps, being that "whereas at the beginning of the century one-fifth of the value of our exports was taken for national expenditure, to-day our national expenditure amounts to the appalling proportion of one-half of our whole export trade." The resolution was seconded by Sir Eric Geddes, who dealt with an aspect of the question which is of particular concern to the "JOURNAL"—that is, the effect upon industry of the present demands of the tax collector. "It was," he said, "the methods of assessment which were absolutely sucking the life-blood of industry. In a year when the stockholders of the equity of a large industrial organization could receive no dividend, the law enforced the payment to the tax-gatherer out of past profits reserved in the undertaking of a sum equivalent to about 5 p.ct. dividend gross on the ordinary stock, and the stockholders had to find this out of what to the individual would be his savings or capital. That was not taxation of profits, it was confiscation of property. In such circumstances, how could industry prosper?"

Too Many Meetings?

SPEAKING of economy leads one to another part of the proceedings last week of the Society of British Gas Industries—that is, to the dinner. As usual, this was one of the outstanding social functions of the Industry, and one, therefore, which we should be very sorry to see abandoned. But it might still take place, even if a suggestion by Alderman F. J. West were adopted. Alderman West, who contributed one of a number of first-rate speeches during the evening, referring to the general call for economy at the present moment, suggested that the Gas Industry might well consider the economy of time in regard to the many meetings held dealing with the affairs of the Industry. Was it not possible, he asked, to arrange that the annual meetings of the leading gas organizations should be brought into one week? He instanced the annual meetings of the National Gas Council, the Society of British Gas Industries, and the Institution of Gas Engineers, but he purposely left out of consideration the annual conference of the British Commercial Gas Association, which, as he rightly pointed out, is fixed for different places in the Provinces, and thus affords unrivalled opportunity for propaganda.

The possibility of economizing the time of the public-spirited men of the Industry is, we know, a question which has received earnest consideration in various quarters. Remarks which we have heard from time to time convince us of the existence of a desire that everything possible in this way should be done. The annual meetings of these organizations are, however, only one part of the problem, and that the smaller part. There are besides Committee meetings, &c., which place a heavy burden on the "willing horse." But Alderman West has sent up a kite which may prove to have a long tail. Whatever comes of his suggestion, however, we repeat that we should be sorry if one result were to be the abandonment of the annual dinner of the Society of British Gas Industries.

A Concrete Case

FROM time to time we have come across some startling evidence of the extent to which local authorities owning electricity undertakings may be tempted to go in depriving their housing estate tenants of freedom in the choice of methods of lighting, heating, and cooking; but it may be confessed that even we are astonished at the latest "concrete case." At the last annual meeting of the Gas Light and Coke Company, Sir David Milne-Watson, while recording with pleasure that in certain quarters there had been an improvement in the matter of unfair competition, said that unfortunately there were a few municipalities controlling their own electrical undertakings who, fearing to leave the choice between gas and electricity to the tenants of new houses and flats, took the unfair precaution of excluding gas from the start. That, he declared, was a tendency that the Company meant to fight both as traders and as large ratepayers.

This is a determination in which, we are glad to see, the Company have not weakened, and the upshot is the "concrete case," which the Company have succeeded in bringing well into public notice by the simple plan of refusing to pay their rates. It was all done very nicely, and after Mr. F. J. Wrottesley, K.C. (who was instructed by the Company's Solicitor, Mr. A. Potter), had clearly put forward his amazing statement, for which he was thanked by the Chairman of the Bench, it was announced that the rates would no longer be withheld. The Tilbury

Urban District Council had summoned the Gas Light and Coke Company at Grays Police Court for non-payment of these rates. A large proportion of the mains which were the subject of the assessment had, it was explained, been laid under an agreement which the Grays Company (subsequently taken over by the Gas Light and Coke Company) entered into with the Council in 1922. In accordance with this agreement, the Grays Company (who expended £21,000) equipped every house with meter, cooker, &c.

But in 1930 a change came over the policy of the Council. And here we cannot do better than quote Mr. Wrottesley himself: "Apparently being in difficulties with their electricity undertaking—and one observes a deficiency on the back of the demand note—they bethought themselves of recouping their losses by compelling the tenants of their various houses to take a supply of electricity, whether they wanted it or not. Now these houses were built mainly out of public money, and we have contributed to the building of them. They compelled their tenants, whether they liked it or not, to take electricity, which was tyrannical, improper, and unjust treatment. It was in 1930 that they conceived this idea, and they went to the length of cutting off gas supplies which had been put into houses under this very agreement. They went farther than that. In order that people who wanted gas should not get it, they actually went to the length of pouring cement into gas pipes of some of the houses on the housing estates, in order that the incoming tenant, where there was a change of tenancy, not merely might not have a supply of gas, but might not easily get it."

In the course of his statement, Mr. Wrottesley urged that it was time that, before an independent tribunal, the facts should emerge; and we are glad to see that they have emerged. Such a condition of affairs should in some way be rendered impossible. Mr. Wrottesley went so far as to say he believed in one case where a house was vacated by one tenant and a new one was coming in, under the instructions of the Council a workman was sent who cut the pipe in such a way that had the meter been used the result would have been an escape of gas, which would have been a danger to life and limb. "And," he added, "this is in England, not Russia. If the Council continue trying to prevent the Gas Company from using the pipes which they laid down under Parliamentary Authority for the purpose for which Parliament intended them to be used—to supply gas—there is no question that the rates to be paid for these pipes will have to be gone into afresh. Only two possible solutions remain—a reduction in the rates for the pipes or a change in the views of the Council. There are now 204 people wanting gas on this housing estate, and they are afraid to take it for fear they may be turned out. Further, in the case of this housing estate, there are many people who cannot afford to pay the price of electricity. The position is therefore one of intolerable hardship."

This is a "concrete case" which we sincerely hope will remain unique.

Machines in the Office

"Profits are made or lost in the retort house" is an old tag which resulted in an increase in the efficiency of gas production, which is all to the good, but it concentrated attention on production only, and left sales and service to take care of themselves. A remedy to this disproportion has fortunately been found. Economy and efficiency in the production, supply, and utilization of gas does not end here, however; and it is with gratification that we turn to the Presidential Address of Mr. Ernest Ablett to the Wales and Monmouthshire Association, in which he deals with another phase of economy—office economy—in particular relation to the Swansea Gas Light Company, of which he is Secretary. It is almost unnecessary to say that this section of a gas undertaking's activities has a most important bearing not only on the price at which gas can be sold, but also on the general public impression created by the undertaking, and therefore on its goodwill. Office work can, of course, be over-organized; this, indeed, is a danger in a mechanical age. But, on the whole, a good deal of time which is at present wasted could be saved by the Gas Industry by the installation of modern machinery and by careful organization of office work. Modern office machinery has a very wide range of utility, and billing, calculating, and costing machinery has undoubtedly come to stay. Only a few months ago we published in our columns a most valuable account of the use of machinery applied to costing in relation to gas manufacture by a large undertaking in the Metropolis. Mr. Ablett confines his attention to normal office work, but his description shows—as did the article by Major R. N. Barnett in the "Journal" in January last—the flexibility of mechanical office equipment.

Mr. Ablett contends, and proves his contention, that office machinery is in no sense a luxury, and that its economical use is not confined to the large undertaking. He maintains quite rightly that such an outlook is prejudicial to progress, salesmanship, service, and selling costs. Office charges are charges which the consumer has to pay, and which are likely to increase rather than diminish, unless something is done about them. Something has been done at Swansea; as a result of machine billing a yearly saving of over £400 has been attained. This saving is the cumulative effect of a number of benefits, among them being reduction in wages and salaries of the rental staff; earlier flow of gas rental receipts, resulting in reduced charges on overdraft; more even flow of gas rental receipts and quicker receipting, resulting in greater opportunities for salesmanship in the showrooms; and improved facilities for concentration on unsatisfactory accounts. With the system in vogue at Swansea a consumer receives his account two or three days after his meter has been read, and hence any complaint can be disposed of with greater satisfaction to both undertaking and consumer. The author points out that team work is essential to satisfactory working of the system, and observes that the staff would not like to revert to the old conditions. Machine billing naturally leads one to consider monthly rendering of accounts, and though at present the Swansea Gas Company do not operate on these lines, Mr. Ablett confesses that monthly billing is the only system of continuous billing which has any real appeal to him; and he adduces an attractive argument in favour of the method. In circumstances such as exist at Swansea, where the same rate of remuneration is paid for the collection of money from prepayment meters as for the reading of ordinary meters, monthly billing would reduce wasteful walking time by eliminating the overlapping which ensues when the work is done by two separate departments. Continuous meter reading is no novelty either to this country or to countries overseas, as the "Journal" for several years past testifies. The method, which has so many points in its favour, and which is being applied by gas undertakings both company-owned and run by municipalities, has been the subject of much comment in these columns.

There can be nothing but agreement with Mr. Ablett in his insistence that, if our Industry is to gain the business which can be obtained, the old flat rate system of charge will have to go, and a price list of wide range will have to take its place. Without this, the unprofitable consumer will remain a burden on the undertaking, and a great deal of both domestic and industrial business will be lost. The Swansea Gas Light Company have a scale under which the price per therm varies in accordance with the quarterly amount of gas consumed, and ten different prices per therm are actually in operation. Now any such price list as this necessarily entails increased work in the preparation of gas bills; and if the system is to be maintained on sound lines, detailed analyses of production costs and of gas consumptions and receipts in the classification adopted are a *sine quâ non* to success. And in this connection we thoroughly agree with Mr. Ablett's suggestion that if there is to be no increase in expenditure which is not directly productive, there must be a greatly extended use of modern office machinery by gas undertakings.

PERSONAL

Sir ARTHUR MCDOUGALL DUCKHAM, of High Warren, Ashtead, Surrey, Chairman of the Woodall-Duckham Companies, British Furnaces, Ltd., and other companies, left £78,338 (net £28,674).

The appointment of Assistant Engineer and Secretary to the Newmarket Gas Company, recently advertised in the "JOURNAL," has now been made. Mr. R. H. SAUNDERS, at present Assistant at the Gas-Works, Slough, is the successful candidate out of 104 applicants.

OBITUARY

Amid manifestations of popular esteem the funeral took place at Bocking, Essex, on Saturday, May 28, of Mr. WILLIAM SURMAN, who died, aged 62, after being Manager of the Braintree and Bocking Gas-Works for thirty-seven years. Six months ago he was taken ill, and a serious operation followed. He began his gas engineering career as an articled pupil at Bath. His only son, Mr. Cyril Surman, holds a responsible position at the Braintree Gas-Works.

THE NEWS OF THE WEEK

Southern Association of Gas Engineers and Managers.—The summer meeting of the Association has been arranged for Friday, July 1, at Ramsgate.

Dewsbury Gas Committee has had the name of the town painted on the top of the largest holder at the gas-works at Savile Town, with an arrow pointing northwards, as a guide to air pilots.

Satisfactory Results are reported by the Abertillery Gas Department for the year ended March 31, 1932. The coal gas made amounted to 92,948,100 c.ft., compared with 89,041,200 c.ft. in the previous year, an increase of 4·3 p.ct.

Llanelly Gas Light Company are having an exhibition. This opened at the Engineers' Hall, Murray Street, Llanelly, on Monday, May 23. There are daily gas cooking demonstrations with the "Bakerloo" and "New Wilson" cookers.

Austrian Gas Production.—The production at the municipal gas-works at Brunn amounted last year to 425,679,300 c.ft.—an increase of 9·2 p.ct. over 1930. The output of gas from the municipal gas-works at Innsbruck, in the Tyrol, during 1931 was 214,502,800 c.ft.—an increase of 12¼ p.ct. over the preceding year.

A Net Surplus on the Gas Department of £3510 was reported by Accrington District Gas Board on May 26. Mr. A. J. Harrison, Engineer and Manager, stated the gross profit was £37,623, less £27,247 for annuities, sinking fund, &c., and £6865 income-tax. The accumulated balance was £15,870. The accumulated revenue reserve was £2253.

At an Empire Exhibition opened in Douglas by the Lieutenant-Governor of the Isle of Man (Sir Claude Hill, K.C.S.I., C.I.E.), lectures in gas cooking were arranged by Mr. A. R. Bissett, Manager of the Douglas Gas Light Company, who was congratulated by the Governor on his enterprise. Sir Claude Hill spoke of the debt of gratitude they owed to Mr. Bissett and the Gas Company.

The North of England Auxiliary Association are holding their twenty-fourth half-yearly meeting at the works of the Washington Chemical Company, Ltd., Washington Station, at 2.30 p.m., on Saturday, June 18, when the chair will be taken by Mr. C. Stanley Read, Engineer and Manager of the Chemical Company's Gas Department. After the business meeting and Chairman's Address, the members will inspect the works.

A Reduction in Gas Charges of 1d. per therm has been approved by the Todmorden Town Council for the next two quarter-years as a gesture of sympathy with the local gas consuming community, who are sharing the general industrial hardships of the North. It was reported that the undertaking had had a successful year, and it is hoped the reduction will result in an increase of consumption sufficiently substantial to enable the price to be stabilized at the lower figure.

Honiton's Street Lighting.—Whether the streets of the town should be lighted by gas or electricity during the next five years was the point to be decided by the Honiton Town Council at its meeting on Wednesday, May 25, and eventually it was resolved to adhere to gas. Tenders were received from the East Devon Electricity Company, Ltd., and the Honiton Gas and Coke Company, Ltd., and the Council accepted that of the latter. It was mentioned that by accepting the gas tender the Council would effect a saving of £50 per annum.

The Chorley Town Council is to apply for sanction to borrow £5000 for the extension of mains and services in connection with the Gas Undertaking.

A New Light for Artists' Studios.—Mr. Herbert J. Finn, the well-known landscape artist, has recently had his studio in Chelsea equipped with "Daylight" gas mantles, with the result that he now has no hesitation whatever in carrying on work at night-time. Mr. Finn has lately been commissioned to carry out painting in water colours depicting industrial works and the processes carried out in them, and also the wards and laboratories of our best-known London hospitals. Mr. Finn lights his large studio at a cost of only 3d. an hour. Full particulars as well as illustrations of this studio lighting installation are contained in the latest issue of "A Thousand-and-One Uses for Gas," published by the British Commercial Gas Association.

Messrs. Meters, Ltd., Manchester, show a net profit for the year ended March 31, 1932, amounting to £17,635, which added to the balance of £3702 brought forward gives a total of £21,337. After deducting the interim dividends amounting to £6366 paid in November last, the amount now available for appropriation is £14,971. The Directors recommend the following: (*a*) The payment of final dividends for the year ended March 31, 1932, of 2¾ p.ct. (actual) upon the preference shares, and of 6½ p.ct. (actual) upon the ordinary shares, making the total dividends for the year 5½ p.ct. upon the preference shares and 9 p.ct. upon the ordinary shares (both *less* income-tax); (*b*) that the balance of £2519 be carried forward to next year's accounts.

The Annual Report of the Blackburn Gas Engineer and General Manager (Mr. G. P. Mitchell) stated that the quantity of gas made during the year was 1,083,240,000 c.ft.—an increase of 1,398,000 c.ft. The total expenditure on revenue account was £129,955—a reduction of £14,012—while the income was £196,435—a decrease of £5669. The gross profit was £66,479, against £58,137 last year. The net surplus was £4640. The latter has been deducted from the deficiency brought forward of £20,697, making a net deficiency of £16,057. A transfer of £5000 is being made from the rates during the coming year, further reducing the deficiency to £11,057. The capital expenditure to March 31 was £1,136,266, of which £7346 has been expended during 1931-32. The total borrowing powers exercised are £1,129,863, of which £429,863 is outstanding.

Floods in the Rotherham District.

The floods which caused so much damage in Rotherham nearly succeeded in putting the town in darkness—but not quite. The Electricity Station was partly out of action, and the supply of gas from the coke ovens was completely cut off.

Early on Sunday morning, May 22, the South Yorkshire Chemical Works at Parkgate were flooded, and the supply of gas from the coke ovens there ceased immediately. The stand-by carburetted water gas plant erected at the Rotherham Gas-Works eighteen months ago was lighted up, and steps were taken to obtain the necessary supplies of coke and gas oil for a continuous run. The plant started making gas within twelve hours of the alarm being given, but as the type of plant is a new one to Rotherham, the inexperience

THE NEWS—*continued.*

of the workmen, together with mechanical troubles in the boiler house, prevented the full output from being obtained for some time.

During the Monday morning the bridge across the river at Canklow, which carried the supply main of crude gas from the Canklow Coke Ovens to the Gas-Works, was washed away, and the main suffered damage, so that the gas supply failed there also, and the gas-works had to rely on its own resources entirely.

Unfortunately the water gas plant, which was installed to provide for the town's domestic requirements, could not cope with the industrial demands, and before all the gas furnaces at the various works could be shut down the stock of gas got very low.

The supply of gas to the town never failed, although the character of carburetted water gas of the same heating value as the coke oven gas is so different that difficulty was found in using it in many domestic appliances without adjustment of the burners.

As soon as the river water at Canklow was reduced, repairs to the gas main were effected and supplies of gas were obtained from the Canklow Coke Ovens early on the Tuesday afternoon, and full supplies for domestic and industrial users were available at 8 p.m.

Although the floods have meant a lot of extra hard work by both the staff and the workmen of the Rotherham Gas Department, Mr. J. T. Haynes, the Engineer and Manager, informs us, there was some exhilaration at seeing "the wheels go round again and gas being made."

Thus the expenditure on the water gas plant two years ago, which was severely criticized in some quarters at the time, has been fully justified.

Signs of Improving Conditions.

The following may be of interest to our readers as being indicative of a certain improvement in the general business position in Australia.

The operations of the Gas Supply Company, Ltd., which controls the Gas Undertakings at Sale, Warracknabeal, Stawell, Ararat, and Bacchus Marsh in Victoria; Albury in New South Wales; and Cairns, Mackay, and Gympie in Queensland, for the nine months ended March 31 last, have resulted in an increase in sales of gas of 0·3 p.ct. over the corresponding period of last year.

The Company's sales of appliances (gas stoves, heaters, &c.) for the same period are 60 p.ct. ahead of last year.

Exhibition at Swansea.

The Swansea Gas Light Company, in an exhibition opened at the Capitol Dance Hall, Swansea, on May 23, are ably assisted by a number of firms. It is being held under the auspices of Messrs. Radiation, Ltd., and the closing date is Friday next. Miss White, one of the Radiation experts, conducts cookery lectures and demonstrations with the "New World" cooker.

Mr. E. H. Leeder, Chairman of the Swansea Gas Light Company, performed the opening ceremony. He was supported by Mr. W. H. Johns, Engineer and Manager to the Company.

New Issue of Capital at Bristol.

Over £1,000,000 Offered.

The subscription list for an issue of £200,000 general capital stock in the Bristol Gas Company (5 p.ct. maximum) at £94 10s. was opened on May 24 at 10 o'clock and closed at 10.5, having been more than five times oversubscribed.

This is tribute not only to the high standing of the Company, but to the confidence of Bristol people in an essentially Bristol concern.

The general capital stock of the Company amounts to £1,722,500 authorized and £1,325,120 issued, with debenture stock issued and paid up of £662,536.

The new issue is required to provide capital for extensions already carried out, and for the general purposes of the Company. Further extensions of the works and distribution plant are necessary in order to meet the growing demand for gas. The Directors consider that the result of this expenditure, when made, will be to increase the revenue earning capacity of the undertaking.

It is interesting to note that the Company's consumers have increased since 1890 from 21,788 to 105,571, gas stoves in use from 1587 to 94,345, and mileage of mains from 250 to 517. Consumption of gas in the same time has increased from 1469 million c.ft. to nearly 4397 million c.ft.

Successful Gas Exhibition.

A series of gas cookery lectures and demonstrations, and an exhibition of modern domestic gas appliances, were held last week in the Redditch Gas Company's Showrooms. The demonstrations were given by Miss C. P. Hill, C.D.S., Y.T.C.H., and the cookers used were Radiation "New World," fitted with the "Regulo" oven heat controller. The "mysteries" of automatic cooking were explained, and a whole dinner was cooked in the oven at one "Regulo" setting and time.

A gas meter, with a graduated dial, showing the cost of gas consumed in cooking operations revealed the cost of cooking the complete dinner to be less than 1½d. An excellent all-round programme was carried out, and was well received, and a cake-baking competition was arranged.

Scottish Junior Gas Association (Eastern District).

The Annual General Meeting of the Scottish Junior Gas Association (Eastern District) was held in the Gainsborough Hall, Edinburgh, on Saturday, May 14, 1932, when Mr. D. GARRIE, of Burntisland, the President, presided over a large attendance of members.

In calling for the adoption of the annual report and balance-sheet, the President remarked that the Association, though having only 120 members, was in a sound financial position owing to the policy of keeping expenditure within their income.

Congratulations were extended to Mr. D. Yule, of Alloa, immediate Past-President, on his appointment as Distribution Superintendent at South Shields; while appreciation of the services of Mr. Andrew L. Duff, Hon. Secretary and Treasurer, who is relinquishing office this year, was made with acclamation.

The following Office bearers were appointed for Session 1932-33:

President.—Mr. David Warden (Dundee).
Vice-President.—Mr. William Scott (Tillicoultry).
Hon. Secretary and Treasurer.—Mr. J. M. Dow (Perth).
New Members of Council.—Mr. A. C. Rea (Edinburgh), Mr. David F. Dickson (Cowdenbeath), and Mr. James D. MacDonald (Prestonpans).

Following the business meeting, answers to questions submitted by members were read and discussed.

Institute of Physics.

In opening the new reading rooms at the Institute of Physics on May 24, Lord Rutherford, the President, explained that they were provided to give greater opportunities to the members of the Institute and its participating societies. Members could meet each other there for the purpose of discussing the problems of physics. Also, through the co-operation of the Physical and Optical Societies and the other participating societies, a large number of books and periodicals have been provided. The intention is to gather together a small library of text books and reference books, and the nucleus of such a library already exists.

At the annual general meeting of the Institute held after-

wards, Lord Rutherford said that remarkable progress had been made in the short time since the foundation of the Institute. It was founded in order to urge the importance of physics, not only as an academic subject, but as a profession of value to the outside world, and there has been a rapidly growing recognition of its importance.

Gas Lighting in Sheffield

In a paper last week before the Illuminating Engineering Society on "The Work of a Public Lighting Department," Mr. E. Marrison gave the following figures relating to the number of mantles used during the twelve months ended Nov. 30, 1931:

Nozzles in Use.	Mantles Used.	Mantles Used per Nozzle.
38,373	92,110	2·4

In looking over our records, he said, we find that some men use a far greater proportion of mantles than others. The fact is taken into consideration that some rounds are in a worse locality than others, but we find that in actual experience the man who uses a small number of mantles usually has a well-kept round, which proves that carefulness in the handling of lighting plant is a most important matter. When a round is kept up to a high standard of efficiency the attractiveness of the thoroughfares in that round is increased, and the safety and convenience in those thoroughfares are largely dependent upon that factor. At the same time, the street-lighting system is more economical and the value of our department is enhanced. There is no doubt that the efficiency in street lighting depends very largely on the adequate reporting of and attention to defects by the lamplighting staff, and great care is taken to make this as comprehensive as possible by using daily work lines and other forms which provide for every variety of report likely to be encountered. A monthly note is handed to each lamplighter giving the average of mantles used, and the average over the city. This was initiated to promote carefulness, and undoubtedly it has rendered useful service in this direction.

It is essential to have a good maintenance system in operation if the lighting of a city is to be kept up to a high standard of efficiency. In Sheffield the lamplighters attend to the maintenance of the lamps under their charge as well as lighting, extinguishing and cleaning. Each man has his own area, and for a hand-controlled round he looks after approximately 120 lamps, and for an automatically controlled round 200 to 240. The lamps are cleaned in rotation and a return is made on the daily time sheet previously mentioned. Gas burners must be given careful attention and cleaned periodically, mantles renewed where necessary, and minor stoppages cleared, if good lighting is to be maintained properly. Defects which cannot be dealt with by the lamplighter or attendant are reported to the office and receive the attention of the lamp-erecting staff.

The lamplighter, who has been such a familiar figure in the past, is gradually disappearing, and his place taken by a lamp attendant who does not light or extinguish the lamps. The majority of the street lamps in Sheffield are now automatically controlled by clockwork mechanism individually. The electric lighting in main thoroughfares and new housing estates is controlled by means of time switches. There are still some hand-lit rounds, but these are being converted to the modern method of control. The rate of progress is shown herewith:

Financial Year.	Mechanical Control.			Manual Control.			Total No. of Lamps.
	Electricity.	Gas.	Total.	Electricity.	Gas.	Total.	
1928–29. .	2261	5,830	8,091	287	8696	8983	17,074
1929–30. .	3037	8,083	11,120	155	7309	7464	18,584
1930–31. .	3713	10,513	14,226	154	5195	5349	19,575
1931–32. .	4384	12,842	17,226	121	2845	2966	20,192

Mechanical control is cheaper than hand control, and it is advantageous because practically simultaneous lighting and extinguishing is effected. Busy routes and junctions are more effectively dealt with in this manner, and thereby made safer for the community.

Annual Dinner of the Society of British Industries

Private Enterprise the Hope of the Future

The retiring President (the Right Hon. Lord Eustace Percy, M.P.) presided at the annual dinner of the Society of British Gas Industries at the Hotel Metropole; and among those supporting the Chairman were the Right Hon. L. S. Amery, M.P. (President-Elect); Sir David Milne-Watson; Dr. E. W. Smith; Dr. F. S. Sinnatt; Mr. E. J. Fox; Mr. F. B. Richards; Mr. Frank West; Mr. J. W. Napier; Mr. H. M. Thornton; Lieut.-Col. C. F. T. Blyth; Mr. Samuel Cutler; Alderman F. J. West; Mr. H. James Yates; Mr. G. J. Jackson; Mr. R. E. Gibson; Prof. Arthur Smithells, F.R.S.; Major Geoffrey H. Kitson; Mr. Charles Clare; and Mr. C. Valon Bennett.

The toast of the King having been honoured,

Major GEOFFREY H. KITSON (President of the British Commercial Gas Association) proposed "The Society of British Gas Industries," and expressed the hope that as many as possible of the members of the Society would do the Gas Industry the honour of going to Leeds in the autumn on the occasion of the annual Conference of the British Commercial Gas Association, of which he was President. Speaking of the Gas Industry as a whole, Major Kitson remarked that he had never had any serious misgivings about its future except perhaps in so far as this related to the general industry of the country. A few years ago there were signs that some in the Industry were getting a little nervous and were assuming an inferiority complex, while the general public seemed to be getting into a state of what Sir Josiah Stamp had referred to on his recent return from the United States as "Public puzzledom," although frankly he himself hardly knew what that meant. All this, however, had now passed away, and the public had reached a point where it appreciated that, although there might be some other industry which could supplement the service given by the Gas Industry, there was no chance whatever of the Gas Industry being wiped out altogether. The co-operation between the Society of British Gas Industries and the B.C.G.A. was highly appreciated by the latter. How that started he did not know, but he was quite prepared to assume that it was due to the foresight of the Society and, of course, the manner in which any such advances were met by the B.C.G.A. In any case there was evidence that a great work was being done by the Society and the Association working together. For instance, there was the great publicity given throughout the country, in the Technical Press, to gas appliances and works plants, and the manner in which the service of the Gas Industry was brought to the notice of the general public. There was the wonderful work accomplished in the Gas Section of the British Industries Fair at Birmingham, and, to mention only one other matter in this same connection, there was the material contribution made by the Society to the B.C.G.A. annual budget. By far the best wish he could express towards the Society was the hope that the use of gas would increase in industry and that as industry recuperated so the manufacturers of gas plants and the suppliers of gas would benefit in equal proportions.

PRIVATE ENTERPRISE THE HOPE OF THE FUTURE.

The PRESIDENT, responding to the toast, also commented on the valuable co-operation between the Society and the B.C.G.A., and expressed the deep appreciation of the members of the Society for the closeness of this co-operation. These two departments of the great Gas Industry in this country regarded as the chief title-deed of their partnership that they were unlike some other illuminating and heating industries, in that they existed solely by their own efforts, and not as the result of any subsidies, direct or indirect, from the State. They represented the sound principle to which society, after a somewhat hectic Socialist period, was bound to return——the principle that the greatest secret of successful industry and the successful protection of wealth to meet the needs of others was voluntary effort, private finance, and individual and co-operative efforts to meet the demands. The alternative of artificial development as part of some State policy was inevitably doomed in the long run to failure, and inevitably led into a blind alley. Whatever might be the justification for intervention by the State, whatever had been the justification for it during the war period and since that time in a period of painful, muddled reconstruction, it was in purely private enterprise represented by such bodies as the Society of British Gas Industries and the British Commercial Gas Association that the hope of the future of British and world interest lay.

A GREAT OPPORTUNITY.

The toast of "The Gas Industry" was proposed by Dr. F. S. SINNATT (Director of Fuel Research), who said that the Gas Industry, which had reached the sober age of 130 years, had had various illnesses in its long life which had been overcome by

the energy of those who directed its interests. The original head of the Gas Light and Coke Company was the father of the Industry, and since that time each succeeding Governor of the Gas Light and Coke Company had acted in *loco parentis*. The present Governor was certainly seeing to it that the growing child was carefully looked after. It seemed to him that at no period in its existence was there such an opportunity for the expansion of the Gas Industry as at present. The public was demanding the removal of fog and smoke, and appreciated the benefit of sunlight to the health of the community. It therefore asked for clear skies, and the Gas Industry was the industry which could supply heat in the form of a smokeless fuel. The Gas Industry should be ready to undergo great expansion. Instead of 17 million tons of coal being treated in the gas-works and 40 million tons being burned in the domestic grates, the position should be just the reverse. There were certain rather insidious complaints about, and one was the introduction of fuel oil for heating in places where it would be possible to use gas made from coal obtained in our own country. Fuel oil had certain advantages over coal as regards control and convenience for some heating purposes, but it was by no means as convenient as gas, provided the gas was produced and distributed at a suitable price. In addition to the benzole it produced, the Gas Industry was in a position to provide a substitute which should be used in place of motor spirit for motor transport. It was known that coal could be converted into motor spirit by hydrogenation, but it was sometimes forgotten that it was much simpler to convert a large proportion of high-temperature tar into motor spirit by hydrogenation. In addition, experiments were being carried out in this country which had been comparatively successful in France, and had shown that gas could be compressed into cylinders and used in place of motor spirit for driving motor transport. There was no reason why coal gas should not be used at 200 atmospheres just as simply as it was at 5 atmospheres. The Gas Industry had always been foremost in its appreciation of the results of research, and it was not necessary for him to suggest that some of the problems now being dealt with at the Fuel Research Station were of importance to the Gas Industry. He hoped that in the future it would be possible to establish even closer contact between the Fuel Research Station and the Gas Industry than had been the case in the past, and that problems which were not suitable for study by the Industry itself would be brought before the Fuel Research Board. By this means not only would the Gas Industry benefit but also basic industries.

Hope for Better Treatment.

Sir David Milne-Watson, responding to the toast, with which his name was associated, said: I hope you will all have a good look at me, because my friend Mr. Harrison has produced a stage villain in his valuable paper, and you now see I have returned to normal. [Loud laughter.]

Continuing, Sir David said it was always a great pleasure to be present at the annual gathering of the Society, of which he had had the honour, some years ago, of being President. He remembered that year of office with very great pleasure and it had given him a platform on which he had said some things about electricity which he hoped did some good in steadying public opinion at the time. To-day, the Gas Industry was still developing, still struggling, and still making progress. It was true they had not attained that goal of freedom which had been desired for a long time, but it would be agreed that the Industry was gradually throwing off the shackles which had encumbered it for very many years. Year by year individual companies obtained from Parliament powers which gave them greater freedom to conduct their affairs in a more rational manner, and year by year they managed to obtain from sluggish and unenthusiastic Governments—of whatever complexion they might be—some further relaxation of the trammels which had so long bound the Industry. There seemed to be in the official mind a very large amount of distrust of this very old Industry, and a great deal of freedom had been given to the industry which was their principal rival to-day—namely, electricity. The authorities, however, seemed reluctant to give the Gas Industry freedom in which to meet that competition in a fair field. However, he trusted that this session would at least see the Industry with the power to take an interest in each other's companies and in bodies possessing the same powers. But, although the Industry was obtaining a certain amount of freedom by way of legislation affecting either individual undertakings or the Industry generally, it had still to keep on fighting its battles with its rivals, old and new, and the latest rival, as Dr. Sinnatt had mentioned, was oil. This was really a serious matter for the Gas Industry, and also, he made bold to say, for the country itself. The main industry and the main wealth of this country was derived from coal, and the country would continue to prosper just so long as our coal industry existed and was prosperous. If oil was to supersede coal it would be a serious matter in other directions than the Gas Industry, because on one of our largest railway systems 30 p.ct. of the traffic was coal traffic, and if coal was to be given the go-by and oil take its place there was nothing but a dismal future before this country. He was not putting it too highly in saying that there were a great many things which the Gas Industry could do to help the country in the present time of difficulty. For instance, gas was more convenient than oil, because it did not require any storage capacity. Again, the Gas Industry was in the position to prepare a smokeless fuel which would meet the requirements of the public and would be, at the same time, of great assistance to the coal industry. Still further, Dr. Sinnatt had pointed to the great possibilities of the hydrogenation of tar, which was a much easier process than the hydrogenation of coal itself.

Why Not a Gas Week?

Alderman F. J. West, proposing "Our Guests," referred to the ignorance of the public Press with regard to the Gas Industry, and urged the need for even greater propaganda and publicity in letting the public know what gas is doing and the tremendous value of the Industry to the commercial, industrial, and domestic life of the country. Notwithstanding the publicity work that had been done, he contended that the Industry had for too long hidden its light under a bushel and for too long had adopted the attitude that the steady progress gas had made had placed the Industry in a position in which it could afford to ignore the value of publicity. It must be agreed that their rivals appreciated more than did the Gas Industry the value of self-advertisement, and they had attracted the public eye to a greater extent than the Gas Industry. Therefore, every endeavour should be made to rehabilitate gas in the public mind, a thing which the progress and efficiency of the Gas Industry justified it in doing. Commenting on the general call for economy at the present time Alderman West suggested that the Gas Industry might well consider an economy of time in regard to the many meetings held dealing with the affairs of the Industry. For instance, was it not possible to arrange that the annual meetings of the leading gas organizations should be brought into one week? A fortnight ago the annual meeting of the National Gas Council was held; then there was the annual meeting of the Society of British Gas Industries, and a fortnight hence the annual meeting of the Institution of Gas Engineers was to be held. Many people in the Gas Industry would desire to be present at all three of those functions, and it seemed to him there was scope for some centralization in this respect. He left out of consideration the annual conference of the B.C.G.A., because that was always held in the Provinces and carried out very enthusiastic publicity in the various districts. He was not one who constantly advocated the adoption of American methods, but the Americans had made a tremendous success of their Gas Convention, which occupied a week; and he could not help feeling that it would conserve time and energy here if something on the same lines could be arranged. Finally, Alderman West coupled the toast with the name of Mr. J. W. Napier.

Maintaining a High Standard of Efficiency.

Mr. J. W. Napier, responding to the toast, recalled that the Gas Industry originated in Scotland, but added that if Scotland had done nothing more than provide the Industry with Sir David Milne-Watson it had given to the great Gas Industry a heritage which history would remember and would write upon its tablets of honour. Speaking of the work of the Society he specially emphasized the manner in which it is working with the Universities in raising the standard of education for those entering the Industry, one of the most valuable and potent factors making for its success. He also expressed the hope that there would be the closest possible co-operation between the technical and commercial sides of the Industry. One of the essentials of the Industry was the maintenance of a high standard of efficiency not only in the manufacture and distribution of gas but in the plant and apparatus used for that purpose, and it was in this connection that the Society of British Gas Industries played such an important part.

Dr. E. W. Smith proposed the final toast of "Our New President." Mr. Amery, he said,, stood out as a man of education, an explorer, an author, and a politician. Together with their retiring President, Mr. Amery had been a Member of the Cabinet which had been responsible for the electrical grid, and although there were many in the Industry who regarded this as a disservice to the Gas Industry he personally believed that in the long run it would prove to be of the greatest service to the Gas Industry. Having said this concerning Mr. Amery, Dr. Smith said he would like to tell Mr. Amery a little about the Gas Industry. It had been referred to as a young-old Industry. It was a most virile Industry, and, knowing something about it, he claimed it was really the most youthful and best organized Industry in Great Britain to-day. From the point of view of labour conditions it was incomparable, because the Gas Industry did not know what labour troubles were. Moreover, he claimed that the Industry was in the forefront of every advance of an industrial nature that had ever taken place, and it had nothing whatever of which to be ashamed. In these circumstances, while the Society was honoured that Mr. Amery should have accepted the position of President, he believed that Mr. Amery would be proud of the Industry with which he was to be associated during the coming year. Finally, Dr. Smith expressed the hope that Mr. Amery would appreciate that the feelings of the members of the Society towards him were of the warmest, if only for the reason that the invitation to him to accept the Presidency was made on the suggestion of two very eminent gentlemen, the late Sir Arthur Duckham and Sir David Milne-Watson. Therefore, Mr. Amery's acceptance was a source of great gratification to the Society.

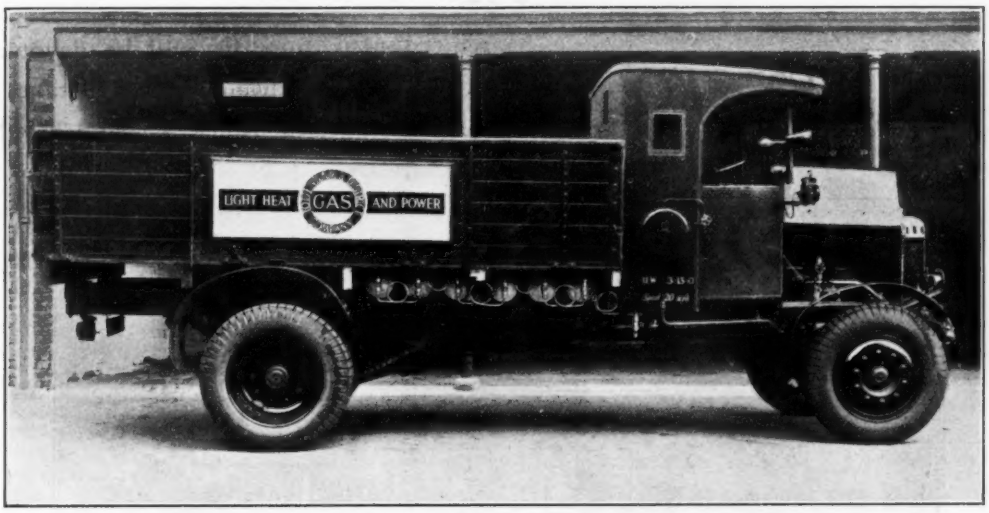
The Right Hon. L. S. Amery, M.P., responding to the toast, said that while it was true that gas was the oldest of our scientific industries, and one that has kept itself abreast at every stage with the advance of science, it was complained that legislation concerning the Gas Industry had not been kept equally abreast of the times. The trouble appeared to be that most of the laws about the Gas Industry belonged to a bygone age, an age in which every scientific discovery was looked upon with considerable misgiving and as something which must be kept severely in check, an age when the man with a red flag had to precede every mechanically propelled vehicle. Concluding, Mr. Amery said he regarded it as a very great compliment that he should have been invited to preside over the Society during the coming year.

At the Hotel Metropole.

A few well known figures—as seen by Fred May.

GAS DRIVEN MOTOR TRANSPORT

An Experiment of Lively Interest at Tottenham



An elevation of the lorry showing the mounting of the bottles. A cover board has been removed so that the bottles may be seen, but when the lorry is in service these bottles are hidden, and with the exception of the reducing valve (on the cab above the unladen weight figure), there is nothing to indicate to the man in the street that there is anything unusual about the lorry.

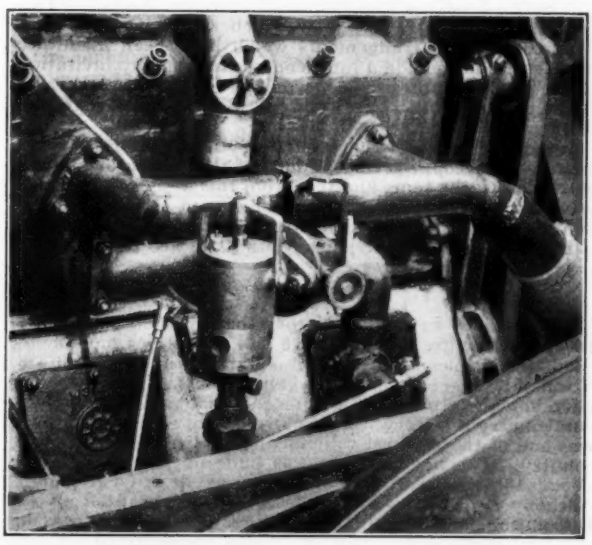
A few days ago, a few miles out of London, we had the opportunity of examining a gas driven motor lorry and of becoming acquainted with its performance on the road; and we may say at once that it was a highly interesting experience. A gas driven motor vehicle is not a new thing, for during the war gas bags were familiar enough; but the technique of this application of gas, thanks to the development of high-tensile steels, has undergone a transformation, and the gas-driven heavy vehicle of to-day is a thoroughly practical proposition from every point of view. As to the economies of the use of gas in place of imported petrol, data have yet to be ascertained; and we are thus concerned in this article with the method of application and not with relative costs.

For some time now, as readers of the "JOURNAL" are aware, the use of gas for driving motor vehicles has attracted much attention in Belgium and France; and in Paris success has attended experiments by the Gas Company in the propulsion by gas of both motor omnibuses and lorries. Investigation, too, is being carried out in this country; but as far as we are aware the lorry forming the subject of this article is the first in Great Britain owned by a gas undertaking and gas-equipped by a gas undertaking for experimental purposes. It is owned by the Tottenham and District Gas Company, and the Company and their Chief Engineer—Mr. H. C. Smith, who recently visited Paris to gain first-hand information on the matter—are to be congratulated on their enterprise and its gratifying results.

At the Willoughby Lane Works at Tottenham the Company have installed a compressor manufactured by the British Oxygen Company, and the cylinders at the moment are being filled to a pressure of 2000 lbs. per sq. in. The cylinders themselves, of which the lorry is fitted with six, are of the greatest interest. Manufactured in Britain by Messrs. Vickers-Armstrong, Ltd., they are in every way suitable for the purpose. Each cylinder, of "Vibrac" steel, is 71¼ in. long and has an internal diameter of 7⅝ in., while the wall thickness is ⅜ in. The capacity is 1·75 c.ft., and when filled with gas to a working pressure of 3000 lbs. per sq. in.—the pressure at which the Company eventually hope to work—each cylinder will contain 350 c.ft. of free gas. (A gallon of petrol is equivalent to from 250 to 260 c.ft. of 500 B.Th.U. gas.)

The steel from which these cylinders are made has remarkable properties, having a yield point of from 62 to 64 tons per sq. in. and a breaking stress of from 68 to 71 tons per sq. in., with an elongation of 22 p.ct. The cylinders are tested to a pressure of 4500 lbs. per sq. in., at which pressure there is no permanent set in the cylinder.

We were impressed immediately with the fact that the man in the street could discern nothing to indicate that the lorry is unusual, unless he gazed long and hard at the right-hand side of the cab, where a reducing valve is fixed. The six cylinders are neatly packed away under the body, and



Showing the gas-mixing chamber together with the **Y** *piece and change-over valve. Simplicity is the keynote.*

are not visible, while no alteration has been made to the engine, which, without modification, may be run on gas or alternatively on petrol. A common pipe from the cylinders connects with the reducing valve, and from the outlet of this a pipe is led to the gas and air mixing device (corresponding to the carburetter) which is shown in one of our illustrations. The mixing chamber is connected to a **Y**

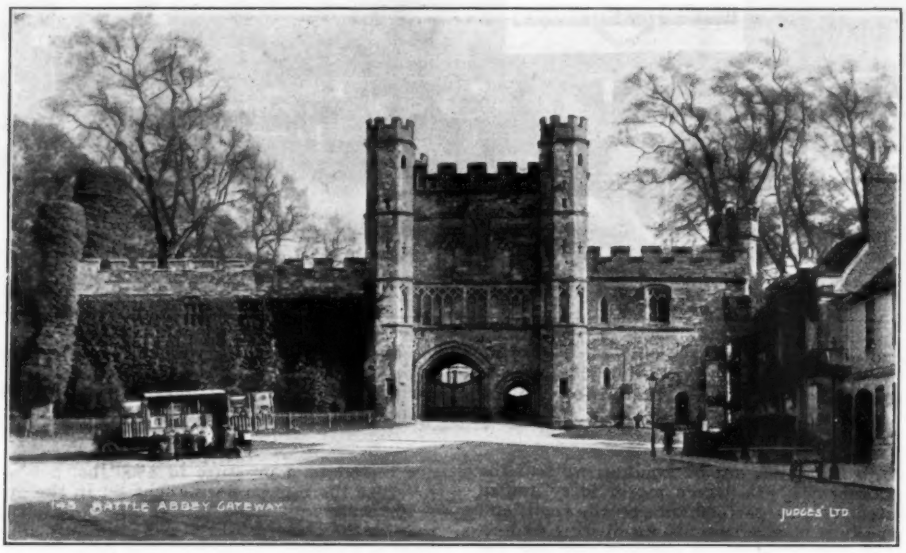
piece, one limb of which is in circuit with the normal petrol carburettor. The third arm is connected to the inlet manifold, and by means of a change-over valve the driver is able to turn over from gas to petrol at will.

No difficulties whatever have attended the use of gas for driving this lorry. It is hoped to obtain sufficient data under practical working conditions to enable the Company to decide whether at a later date to put in a larger compressor and to run more lorries on gas. The lorry is carrying out its ordinary daily work quite satisfactorily, and although, as would be expected, there is a reduction in the maximum power available when using gas as compared with petrol, there is an increase in the acceleration and very much easier starting. Although there is this reduction in maximum power, there is ample power available for all requirements.

The Tottenham Company are doing good service to the Industry by this work; and as a final note we would call attention to the equivalent in (say) prepayment consumers which the consumption of this one lorry represents. The figure for Tottenham may be taken as approximately twenty-five.

THE SUSSEX TOUR

Friday, June 10, will be devoted to the Institution Excursion, which takes the form of a visit to Hastings and East Sussex



GATEWAY OF BATTLE ABBEY.

"Battle-Hastings-Rye-Bodiam-Tunbridge Wells." This is a bald statement of a tour which should prove wholly enjoyable. The arrangements which have been made are excellent, and include a luncheon at Hastings by invitation of the Hastings and St. Leonards Gas Company, and tea at Bodiam by invitation of Mr. C. F. Botley and Miss C. M. Botley.

In connection with the excursion Miss C. M. Botley has written an account giving an idea of the wealth of interest attaching to the tour; and it is from this description, which was edited by Mr. A. M. Apel, Chairman of the Hastings and St. Leonards Gas Company, and which will accompany members on their journey, that we are privileged to take the following notes.

Battle.

The one date in English history that everybody knows is 1066; and few great events have had a worthier monument than the noble Abbey of St. Martin that William of Normandy erected in thanksgiving for the victory that gave him the crown of England and changed the course of our country's history. For many centuries Battle Abbey was one of the greatest religious houses in this part of the country. The fine gateway was built by Abbot Retlynge about 1338. The Abbey Church was destroyed by Sir Anthony Browne, to whom the Abbey was granted at the Dissolution, and who built himself a mansion. It was in this part of the Abbey that the recent fire occurred. From the battlements a view may be obtained of the actual field of Hastings itself, which lay partly inside the Abbey precincts, for the High Altar was placed on the spot where Harold fell. The place is appropriately marked.

Tour in East Sussex.

This part of the journey begins at the Queen's Hotel, Hastings. The road passes eastward along the Sea Front under the Castle Hill towards the Old Town. Hastings was founded in, perhaps, the 8th century, and in the early Middle Ages rose to the proud position of Premier Cinque Port. Later on its prosperity declined, the harbour (on the site of the Queen's Hotel) silted up, there were inroads by the French, and the town decayed till about a century ago, when it became fashionable once more.

From the end of High Street the road begins to climb, and by way of the Old London Road passes through the suburbs of Halton and Ore out on to the Fairlight Ridge, nearly 500 ft. above the sea, from which there are fine views on a clear day. From Ore the road passes on to Guestling. Fairlight Hall is to be seen in the valley and Fairlight Church up on the hill. This latter is so elevated that signals therefrom were used when the surveys of England and France were joined up, the coast of France, 44 miles away, being quite visible in clear weather. The other distant church with a spire belongs to Pett, also in the Hastings Company's district. Guestling leads on to Icklesham which marks approximately the present limit of the Company's district.

From near Icklesham good views can be had of the two "ancient towns" of Rye and Winchelsea. Winchelsea is the nearer. It has had a chequered history. The first Winchelsea lay nearer the sea and was destroyed in a great storm in 1282; thereupon Edward I. began to plan out a new town upon the present hill on a most generous scale. But the place was never completed, what with the retreat of the sea, French raids, and so on. Even the Church was never finished; hence its rather peculiar appearance. To this day, however, one may notice the regular lay-out of the streets. They had town planning even then! The road runs straight past the mansion of Greyfriars, turns the corner by the Church, and out by the fine old gateway. Here we have a view over the marsh towards Rye, whose houses clustered round the church give it a curiously foreign appearance, or, as Henry James said, "a miniature Mont St. Michel." The squat ruins of Camber Castle can also be seen to the right and the miscellaneous collection of bungalows known as "Winchelsea Beach," whose troubles with

the sea in stormy weather were recently so prominent in the Press.

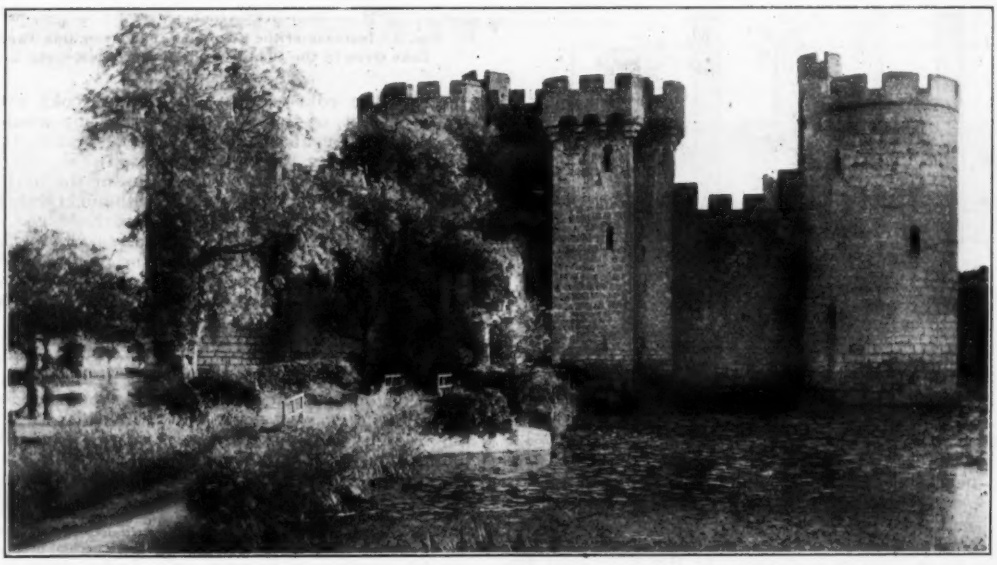
The road to Rye runs across the marsh, which not so long ago (as history goes) was under the sea. When it was built Camber Castle was at the water's edge. Rye is now high and dry—once it was an islet. Passing a well-preserved Martello Tower the road crosses the Old Military Canal, skirts the base of the hill on which Rye is built, and runs inland through the villages of Playden and Iden across the Rother Valley into Kent. Passing Wittersham on the Isle at Brickwall the road turns back at the border, which it reaches at Bodiam.

The view of Bodiam Castle rising from its moat and surrounded by foliage, has been described as one "seldom equalled and possibly not excelled in England." It was, indeed, fortunate that when the Roundhead General Waller demolished the domestic buildings during the Civil War he spared the girdle wall and towers, so that now the Castle, on the outside, at any rate, still looks as it did when first built by Sir Edward Dalyngrugge about 1386. Sir Edward had been a follower of the Black Prince, and thus, when he came to settle down, modelled his country residence on the lines of buildings he had no doubt seen in Gascony. Times were troublous then and an Englishman's house had, in truth, to be his castle as well; hence the fortifications. The Castle, however, only had to sustain one siege in the reign of Richard III., as the then owner was unpopular at Court. The building was presented to the nation recently by the late Lord Curzon.

GENERAL VIEW OF HASTINGS FROM CASTLE, LOOKING WEST.

of Oxney, the village of Small Hythe, with its toll gate and Ellen Terry Museum, is reached, and so on to the handsome village of Tenterden, with its fine broad main street and noble church tower, which is a landmark for miles around. From the bottom of Tenterden the road goes by way of Rolvenden and Newenden, with its quaint little church, across the Rother Valley into Sussex once more, as far as Northiam, an old-world place with its chained oak, under which Queen Elizabeth is said to have changed her shoes when she visited Brickwall House in 1573. This visit has been effectively used by Mr. Kipling in a story in the collection, "Rewards and Fairies." Passing the deer park

From Bodiam the last stage of the journey is by way of Hurst Green on the main London road, through Ticehurst and Wadhurst to Tunbridge Wells.



BODIAM CASTLE.

Coke Oven Gas in the Iron and Steel Industry*

A Paper by Dr. Ing. H. Lent, of the Vereingte Stahl Werke, A.G., before the Institute of Fuel

Up to the year 1910, the distribution of gas in Europe was almost exclusively of only local importance. Every municipal and industrial district had its own gas-works, designed to meet the local conditions and serving local markets. As a rule the market was restricted due to the impossibility of supplying large districts by means of low-pressure gas; on the other hand, the small local gas-works could only serve small industrial plants, on account of high operating costs and variations in the load.

The large-scale development of modern high-pressure gas distribution existed only in the natural gas and oil districts of North America, where natural gas is supplied in large quantities to the iron and steel industry for furnace heating. Thus the supply of coke oven gas by means of high pressure, which has recently become of first importance in Europe, from a point of both low cost of distribution and efficient utilization, had a forerunner in the large natural gas production of North America.

The first condition for the distribution of high-pressure gas is a sufficient amount of suitable coke oven gas. The production of the latter is generally linked up with the production of coal when this is of good coking quality.

With the development of the modern coke oven, the increased capacity of the coking units, and the development of the coke market, it became necessary to find a profitable market for the large quantities of coke oven gas that became available in many of the European mining areas. In Germany, and especially in the Ruhr coal districts, the need for a market for coke oven gas became evident about the year 1910, and became specially emphasized as the result of the post-war developments of the Ruhr coal industry. The natural gas production of North America is to some extent comparable with the coke oven gas production in the Ruhr coal districts, because, through the concentration of a large coking coal production in a small district, with a consequent large coke oven gas production, the conditions for the development of high-pressure gas distribution for great distances were especially favourable.

In the Ruhr coal districts, with a productive capacity of 120 to 130 millions tons of coal, there are produced in normal times about 30 millions tons of coke. Even after the war this coke was produced in a great number of coke plants of old design. The batteries, which had suffered from the war, the inflation, and the Ruhr occupation, were, however, shut down and replaced by large coke plants, built in accordance with modern principles and on sites depending on the technical and economic requirements of the big concerns. These circumstances are illustrated in fig. 1, in

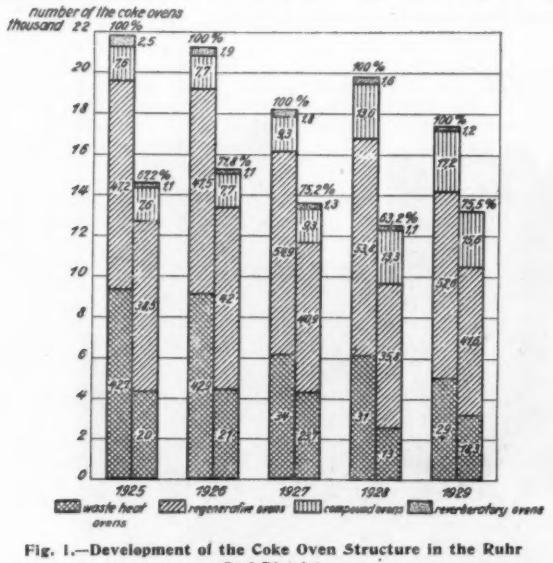


Fig. 1.—Development of the Coke Oven Structure in the Ruhr Coal District.

which the number of new coke ovens, graded according to size, in the years 1925-29 is shown. In the Ruhr coal district the total number of coke ovens fell about 25 p.ct., and there was a marked preference for regenerators and compound coke ovens over waste-heat batteries. The increase of the percentage of compound coke ovens has a twofold reason for going back to the development of the distribution of high-pressure gas, which began in the Ruhr district about 1926 and has since expanded rapidly. The aim of the modern coke oven plants is to dispose of as nearly as possible the total gas output and to use inferior fuel for

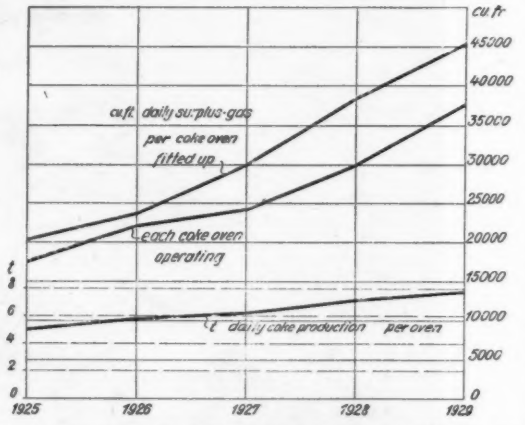


Fig. 2.—Increase of the Coke and Coke Oven Gas Production per Coke Oven in the Ruhr Coal District.

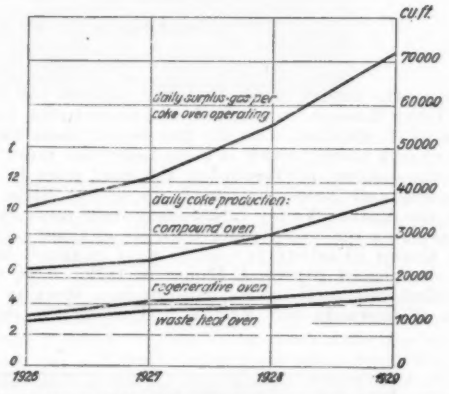


Fig. 3.—Increase of the Coke and Coke Oven Gas Production per Coke Oven in the Plants of the United Steelworks Corporation.

heating the coke ovens. In modern coke oven practice, 50 to 60 p.ct. of the total gas production would be surplus if the coking coal has 25 to 30 p.ct. volatile, the rest being used for heating the coke oven itself.

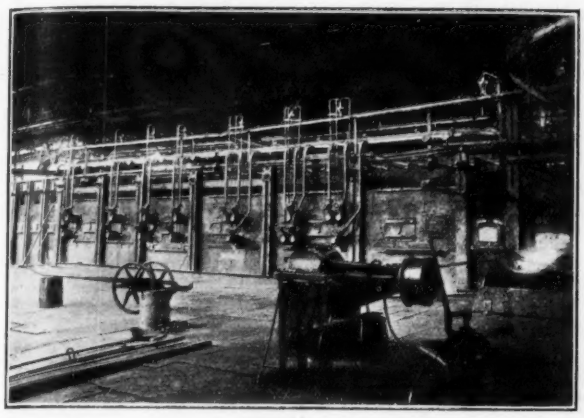
In the year 1910, it was possible for the first time on the Friedrich Wilhelms plant in Mülheim (Ruhr) to heat a regenerative battery with blast furnace gas, a technical achievement which gave a new direction to the industrial development of the Rhineland-Westphalian district.

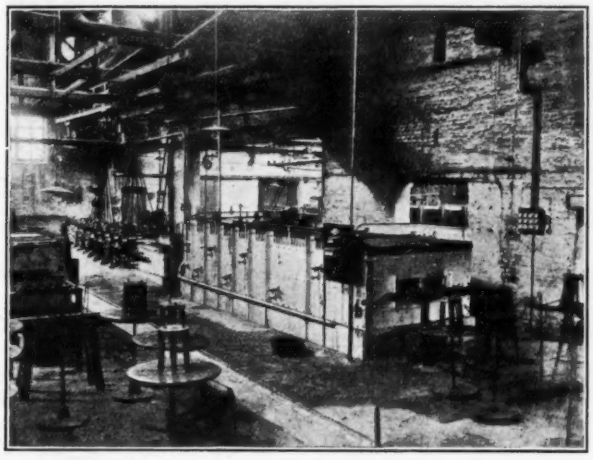
In consequence of the merging of the big concerns about 1926, the structure and location of coke plants were carefully planned out. The coke plants should be built on the coal mines themselves, because transport of the coke would be 25 to 30 p.ct. cheaper than the transport of the coal. On the other hand, it was found desirable that the coke plants should be mostly in the neighbourhood of the large blast furnaces and steel plants, in order that they might be fired by surplus blast furnace gas, the coke oven gas being transported in short pipelines. Two lines have been constructed, for instance, for conveying the blast furnace gas from two blast furnace plants to the neighbouring coke

* We are indebted to the Editor of the British Commercial Gas Association for procuring from the author the excellent series of photographs with which he supplemented his paper, and to the Association for the loan of the blocks.

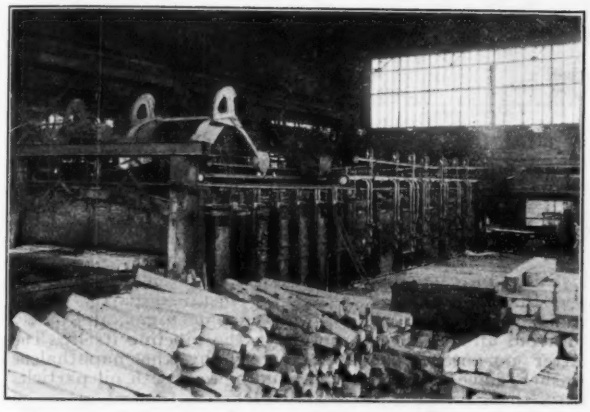
EXAMPLES OF THE GAS-FIRED FURNACES ILLUSTRATED

BY DR. LENT



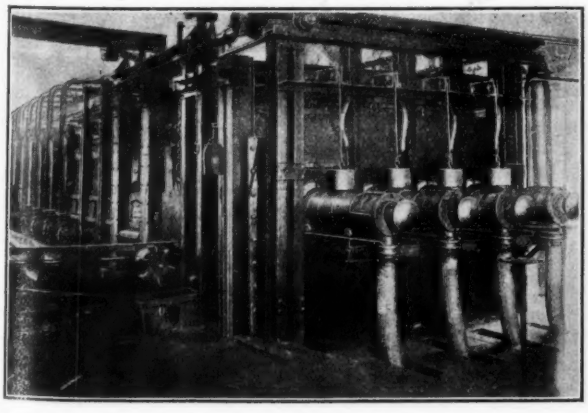


Continuous tempering furnace, with automatic temperature regulation, for wire and strips.

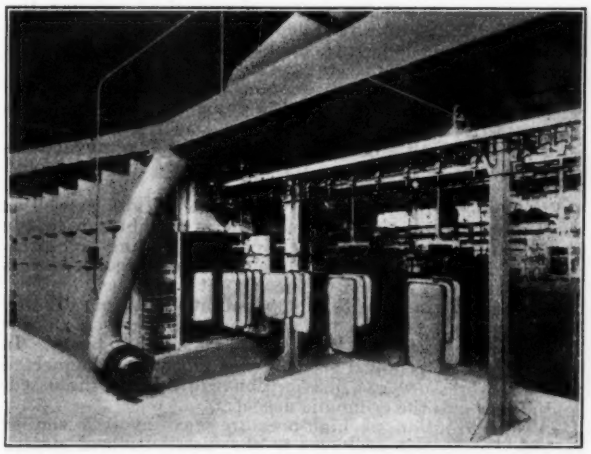


These two photographs are of a continuous double re-heating furnace in a rod merchant bar mill of the Ruhrort-Meiderich Steel Plant. It deals with billets weighing from 700-1200 kg. and has an hourly output of 45-50 tons. Attention is drawn to the side burners which supplement the end burners, the latter not visible in the illustrations. The side burners are located above and below the heated billets, which are carried through the furnace on water-cooled rollers.

Large tunnel furnace with extended combustion zone for making refractory bricks for ceramic and sheet industries, &c.



End view of continuous re-heating furnace for a high-speed rolling mill. The end burners are situated above the heated material, the side burners below.



Continuous enamelling furnace.

oven batteries of 2·5 to 3 miles length, and 0·5 to 0·7 m. diameter, these diameters having been calculated to meet the heat requirements of the coke ovens when supplied with the low calorific value blast furnace gas. The pressure of the blast furnace gas is raised by high-pressure fans for purposes of transportation through such pipelines to 2·844 lbs. per sq. in.

One other factor has recently favoured the construction of compound batteries—namely, the possibility of producing a gas similar to blast furnace gas from widely differing kinds of coke in mechanical gas producer plants.

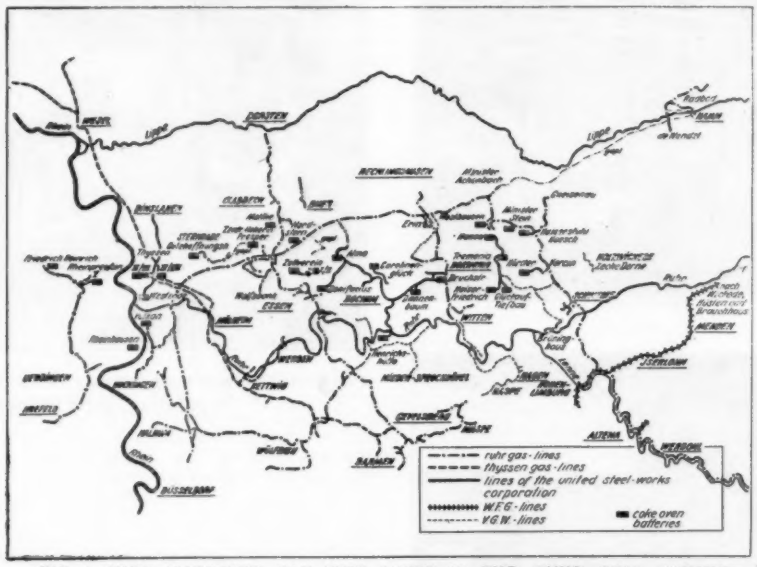


FIG. 4.—HIGH PRESSURE GAS PIPE LINES IN THE RUHR COAL DISTRICT.

Figs. 2 and 3 show how the quantity of surplus coke oven gas has increased in consequence of the increased rate of output of the coke ovens.

High-pressure gas distribution began in the Ruhr district about 1910 (fig. 4). At that time the "Rheinisch Westfälisches Elektricitäts-Werk" laid its first high-pressure gas pipeline from the heart of the Ruhr coal district across the "Bergische Land" to the Rhine, and the Thyssen Works laid a similar line from Hamborn to Barmen. In the post-war period, the surplus coke oven gas was first utilized to satisfy the demand of the larger local steel plants, which had a rapidly increasing demand for coke oven gas in consequence of the economy resulting from the development of gas firing in place of coal. When this first demand was satisfied, the Ruhr Gas A.G., founded in 1926 by 90 p.ct. of the coal mines of the Rh.W. Coal Syndicate, put forward most comprehensive schemes for high-pressure gas distribution. These plans were specially needed due to the foundation of the United Steelworks Corporation. Besides the possibility of merging the coal mines and coke oven plants outlined above, there was an unique opportunity for supplying all the scattered steelworks and finishing departments of the United Steelworks Corporation with sufficient gas to meet their total fuel requirements. It then became possible to realize the ideal of meeting the total fuel demand of all the departments, including a large finishing installation, without using any coal other than that required to produce the coke.

To-day the high-pressure pipelines of the Ruhr coal district amount to more than 620 miles and extend from Aachen to Hanover. The prolongation of this pipeline both to the north and to the east, and the removal of a pipeline from Siegen to South Germany, are to be expected in the near future.

Fig. 4 shows the pipe lines existing since 1910, as well as the present state of high-pressure gas distribution in the Ruhr district itself; fig. 5, the pipelines effecting high-pressure gas distribution in the true sense from the coal districts of the Ruhr and Aachen to the distant provinces.

In these circumstances the possibility was investigated of putting into practice the schemes for high-pressure gas distribution advocated by the Ruhr Coal Syndicate. In this paper the technical aspects of the problems connected with high-pressure gas distribution will first be discussed, and afterwards the economic aspect.

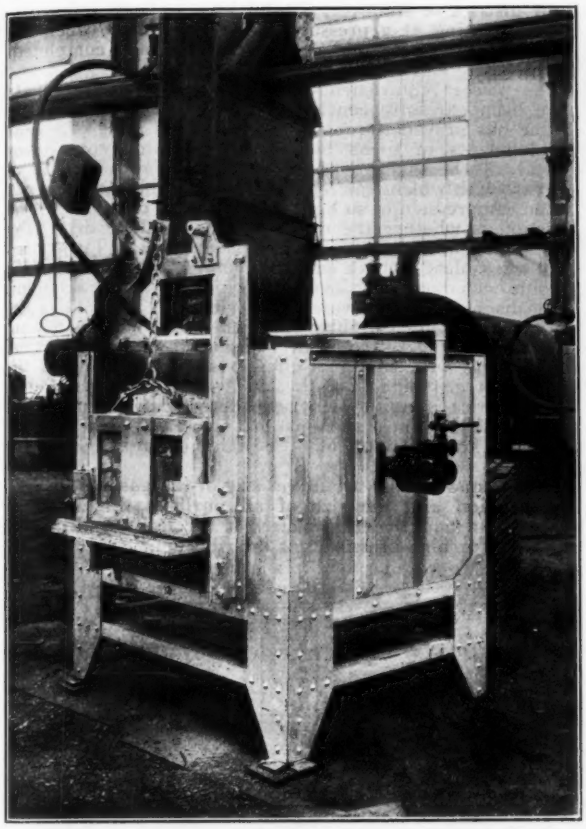
The distribution of high-pressure gas involves similar technical economic problems to the distribution of electrical power from the great electric power stations, except in so far as the fuel is transported in different forms. In the case of the distribution of gas as well as of electric current, a valuable fuel is concerned. Both are in close competition as industrial fuels; but in some respects coke oven gas appears to have a marked advantage. As in the planning of an electric power station, very precise calculations are necessary of the productive capacity of the plant in the relation to the purchasing capacity of the district to be supplied. The dimensions of the various parts must be decided to suit the probable demand—for example, sulphur purifiers, naphthalene washers, high-pressure compressor plants, and, last but not least, the pipeline itself. The sulphur purifiers and the naphthalene washers are installed partly on account of the extra value of clean coke oven gas, and partly to avoid all risk of obstruction in the pipeline itself. The latter purpose is achieved chiefly by the naphthalene washer, since naphthalene in conjunction with oil particles from the gas compressor may give rise to obstruction of the pipelines. The naphthalene is frozen out by spraying the gas stream with wash-oils behind the gas condenser.

Fig. 5.—High Pressure Gas Pipe Lines to Hanover, Cologne, and South Germany.

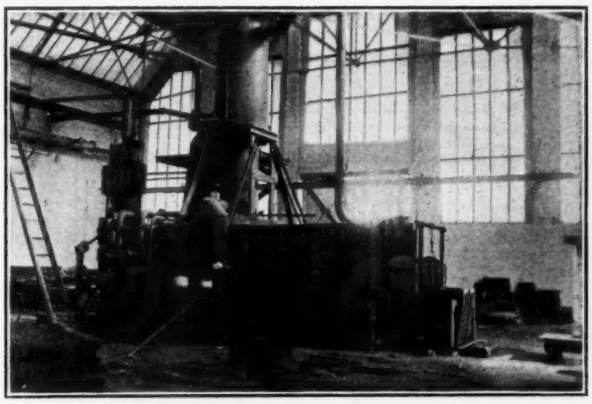
Cleaning the coke oven gas from the hydrogen sulphide contained in it is carried out not only for municipal purposes, but also to render it fit for use in the finishing departments, to avoid lowering the quality of the finished pro-

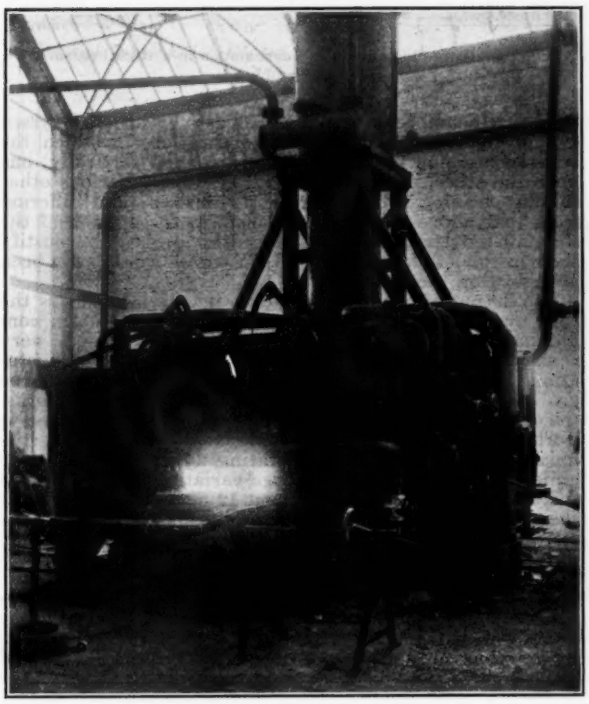
EXAMPLES OF THE GAS-FIRED FURNACES ILLUSTRATED

BY DR. LENT

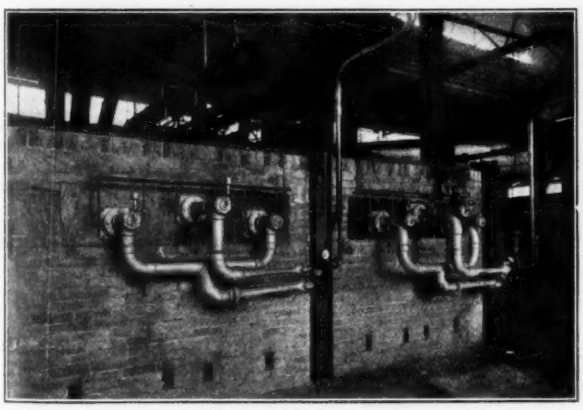


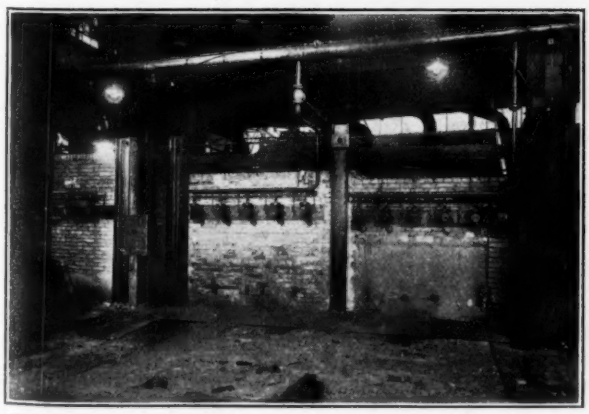
Small portable forge furnace for drop forgings.



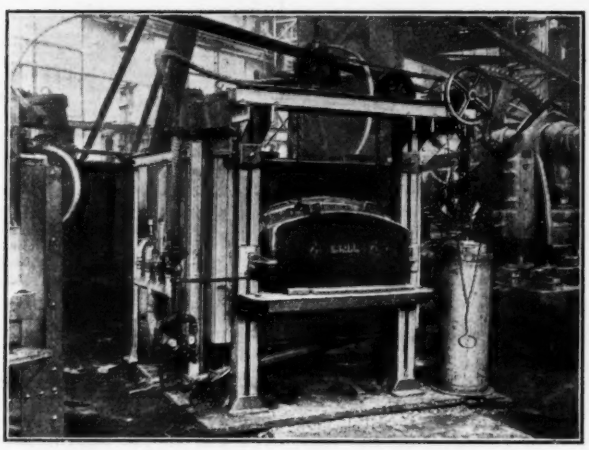


These two illustrations show a forge furnace with external recuperator made of heat-resisting steel for the attainment of the highest possible efficiency.





These two photographs are end views of a plate and sheet annealing furnace, adapted from producer to coke-oven gas for the sheet industry.



Semi-portable forging furnace.

ducts. In Germany, and especially in the Ruhr coal district, the de-sulphurization of the coke oven gas has been generally effected by iron ore arranged in large horizontal boxes. On the other hand, an equipment has been installed

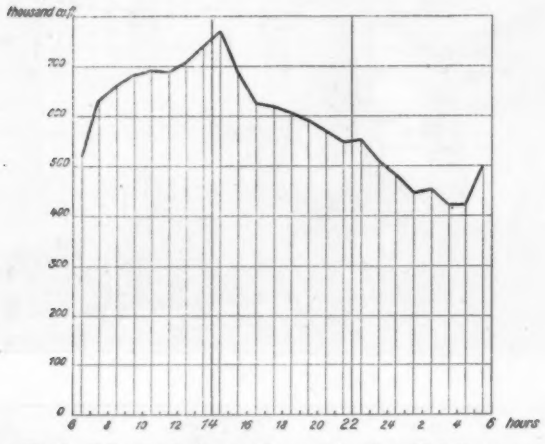


Fig. 6.—Daily Fluctuations of Consumption in a High Pressure Gas Pipe Line.

by Lenze-Sensebrenner in the colliery Friedrich Thyssen 4/8 of the United Steelworks Corporation, in which the boxes containing the iron ore are arranged vertically, one upon the other, in a tower 25 ft. in height. Various other sulphur-cleaning processes recently devised, and differing from that above mentioned, seemed, in the opinion of the German industry, not yet sufficiently proved to justify their introduction on such a large scale as would have been necessary on the Ruhr.

The output of coke oven gas does not vary much, as the coke ovens are operated under more or less uniform conditions, but daily fluctuations in the demand may be very considerable. Fig. 6, for instance, shows the daily fluctuations in a high-pressure pipeline by which the coke oven gas has been transported mainly to iron and steel works, the quantity of municipal gas being small. This line is worked under favourable conditions in that most of the finishing departments are operating 24 hours daily quite uniformly. In spite of this, large variations will be seen in this sketch. The peak load about 12 noon is nearly double the amount of the lowest demand during the night. The method employed in the electric power stations for avoiding excessive load variations by keeping a number of boilers and turbines in reserve is not practicable in the case of gas, and therefore the storage of a large volume of gas is necessary to ensure the coke oven gas supply. In the Ruhr district waterless gasholders have recently been built as large as possible. Fig. 7 illustrates the possibilities of storing the coke oven gas, and shows the location of the gasholders. Even these large holders can only supply the peak load demand. The problem, however, of storing up the gas output on Sundays or holidays is not solved.

For compressing the coke oven gas to the appropriate pressure according to the length of the pipeline, compressor plants are necessary, which must have a sufficient reserve to deal with variations in the gas consumption. Gas is compressed to a pressure of 40-350 lbs. dependent on the diameter and length of the pipeline and the volume of gas to be transported. For instance, the pipeline from the Ruhr district to Hanover, a total length of 200 miles, has been operating at a pressure of 170 lbs.; later, when the pipelines still to be added in the future are completed, this pressure will be raised to 350 lbs.

The power requirements of these high-pressure plants have been carefully considered. The old piston type of engine has proved the most economical, in spite of recent developments in turbo blowers. The piston compressor will always be superior to the turbo-blower on account of the ease with which it is regulated, and its higher efficiency in the compression of so light a gas as coke oven gas. The question is whether the compressors should be driven by gas, steam, or electricity. The gas engine should be used only when blast furnace gas is available, or when sufficient surplus coke oven gas is available which cannot be economically disposed of otherwise. The electrical method is the most expensive of the three mentioned above, both in construction and operation, and is employed in the Ruhr Coal district only in exceptional circumstances, the bulk of the coke oven gas being compressed by steam-driven plant. This practice is employed where there is an adequate supply of inferior fuel, such as belt pickings, coke breeze, dust, and fine coal, at the boiler plants of the neighbouring collieries.

Fig. 7 shows the location and size of the gasholders, also the position and the size of all purifiers, high-pressure plants, and naphthalene washers of the Ruhr coal district installed for high-pressure gas distribution.

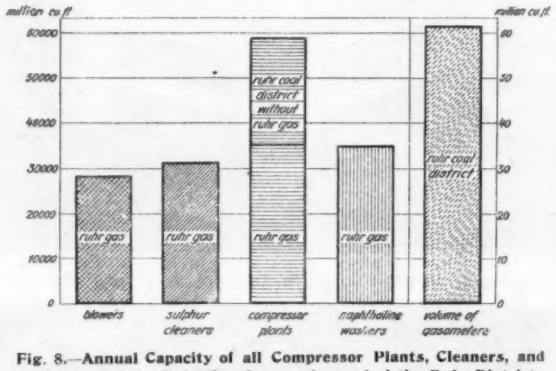


Fig. 8.—Annual Capacity of all Compressor Plants, Cleaners, and Gasholders of the Ruhr Gas Corporation and of the Ruhr District.

Fig. 8 shows the annual capacity of all these installations together. The Ruhr coal district is at present able to store 60 million c.ft. of coke oven gas and has an average annual capacity of 60,000 million c.ft. high-pressure gas available.

Exact calculations are necessary for the design of an economic high-pressure pipeline itself. The installation of a high-pressure pipeline is so expensive, and the operating costs connected with it are so high, that an exact determination of its dimensions is essential. Before such calculations are undertaken, careful estimates must first be made of how much the gas consumption in the districts to be supplied will increase over a period of 30 years—the average life of a pipeline. Then the pipeline diameter must

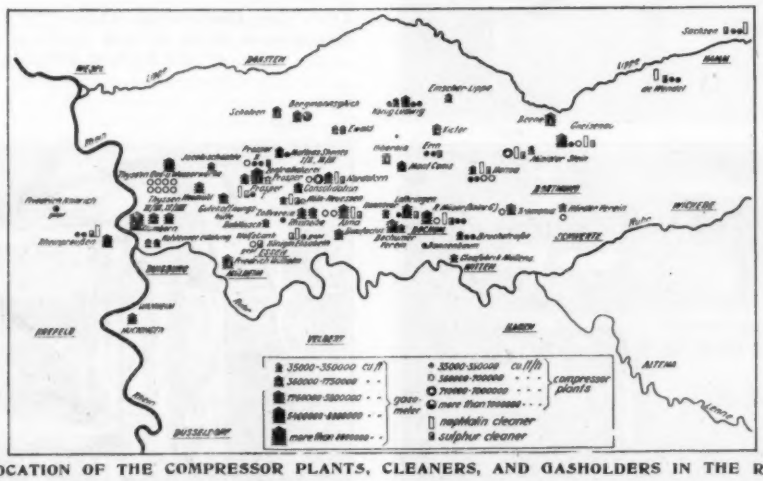


FIG. 7.—SIZE AND LOCATION OF THE COMPRESSOR PLANTS, CLEANERS, AND GASHOLDERS IN THE RUHR COAL DISTRICT.

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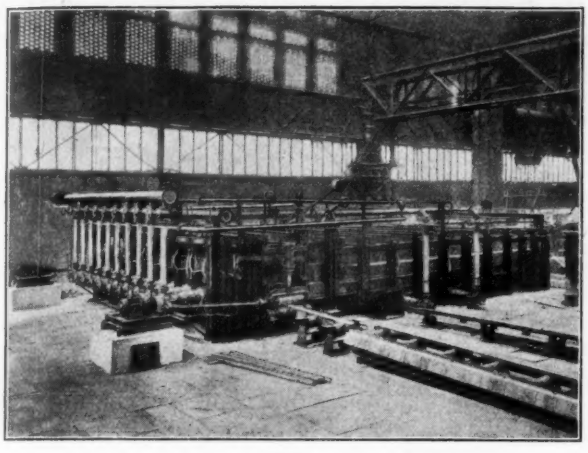
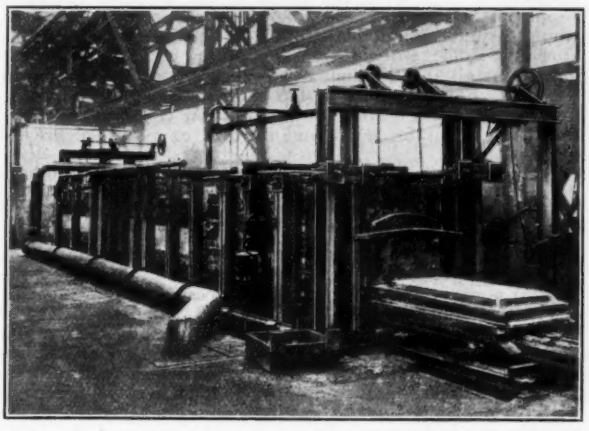
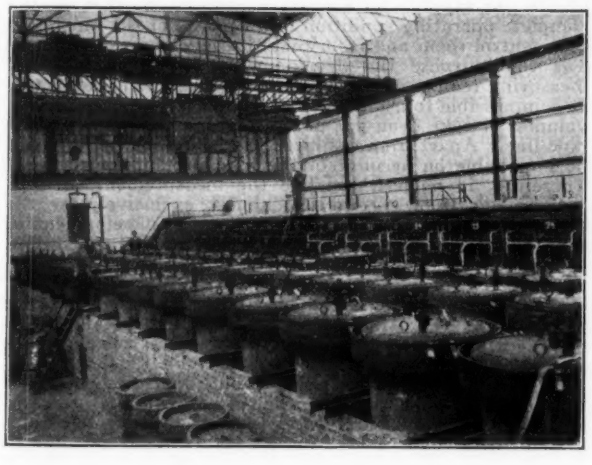
BY DR. LENT

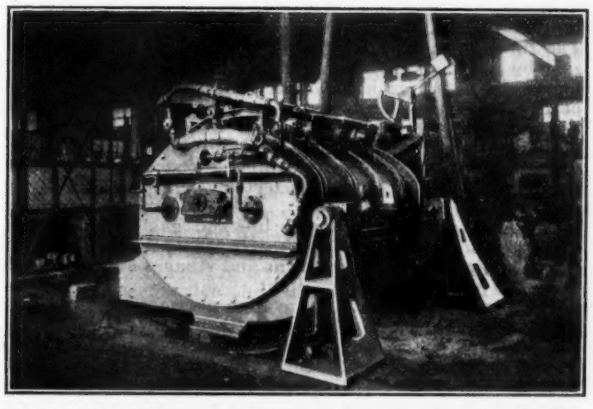


Continuous re-heating furnace.



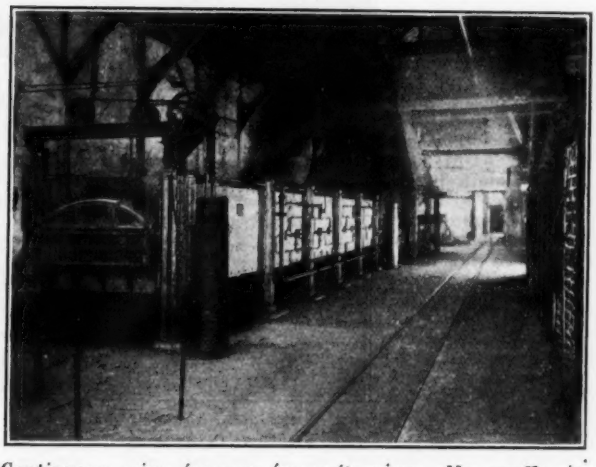
Tunnel furnace for heating railway material such as draw-hooks, couplings, &c.





Half-ton tilting furnace with overhead burners, for melting aluminium.

Two views of pot annealing furnaces for cold-rolled materials.



Continuous wire furnace for soft wires. No muffle is needed, the unprotected wires being exposed to the furnace atmosphere.

be decided according to its length and the pressure used. The development of coke oven gas consumption in the separate districts traversed by the pipeline is of great importance. Suppose in the case of a high-pressure gas distribution of 200 miles length, the gas could be delivered for the first 70 miles at a pressure of 70 lbs. while for the total supply of gas for 200 miles, 280 lbs. would be necessary; it would be uneconomical to compress all the gas to 280 lbs. It would suffice to compress all the gas initially to 70 lbs. and to install at a distance of 70 miles a booster compressor for the supply of the last 130 miles. In this way compressor operating costs, the installation costs of the pipeline itself, and the taxes and interest expenditure are all decreased.

The gas pressure and the diameter of the pipeline are dependent on each other. For each distance and for each gas consumption there is an optimum value of the gas pressure and pipeline diameter for the lowest installation and operating costs. If the pipe is too small the cost of compressing is too high, and if it is too large the capital and maintenance costs are excessive.

The pipelines themselves are built chiefly of steel of 25 tons tensile strength having over 25 p.ct. elongation. Up to 25 in. diameter, seamless tubes are used and above that water-gas welded tubes. All junctions from tube to tube are welded, because only by welded joints can a completely gas-tight line be ensured and dangerous and expensive gas leakages avoided. For the joints of the large pipelines of the Ruhr coal district, the Klôpper welded union or the Klôpper welded ball union have been chosen. Stuffing boxes are only installed in certain cases where the movement of the earth or excessive thermal expansion and contraction have to be guarded against.

The tubes are mostly put into the soil with 32 to 40 in. of cover, which gives sufficient protection under German conditions against frost and mechanical damage. Aerial high-pressure pipelines exist in Germany only in a few exceptional cases, necessitated by peculiar circumstances. The tubes are protected against attack by water, air, and rust by coating them with tar and lagging with wool felt. Successful attempts have been made to replace these imperfect covers by special corrosion-resisting coatings. The protection of the pipelines against attacks of this kind is of particular importance in Germany, because with few exceptions the pipelines are laid under streets and roads, in which they are exposed to electrolytic attack due to the proximity of electric railroads. Stray electric currents are of the greatest danger to the life and gas tightness of a high-pressure pipeline. The safety of operation and the safety against accidents in towns and villages are dependent upon the pipelines being gastight.

The successful operation of a high-pressure gas distributing system involves, in addition to the measures of construction outlined above, a number of considerations concerning operation and superintendence. Methods of superintendence are similar to those in an electric power station where consumption and tension of all lines are continuously fixed. The operation of a power station would not be possible without a switchroom, and an equivalent device is necessary in the operation of a high-pressure gas line. For this purpose the development of a new control system was absolutely necessary, first, for the control of the large gas volumes; secondly, as in the Ruhr district, to overcome the difficulties connected with the pumping by so many compressor plants into one big pipe line of over 80 miles length, collecting the surplus coke oven gas to be distributed. But in addition, the network of distribution lines can only be punctually operated by modern regulation and control systems. The storing effect, an operating peculiarity of a high-pressure pipe line, does not allow us to wait for the drop of pressure in the compressor plant if the gas consumption increases at the end of the line. A line, for instance, from Hamm to Hanover, can meet a gas consumption of 250,000 c.ft. by allowing the pressure to fall from 280 lbs. to 20 lbs. when the compressor plants are idle, without the gas pressure falling below the limit required by the consumers' business. The drop of pressure in the compressor plant, the result of an increase of gas

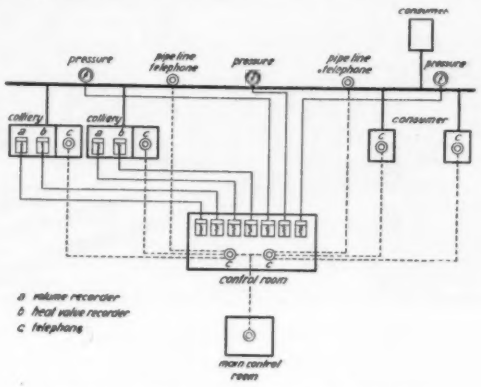


Fig. 10.—Control System of the Ruhr Gas Corporation.

consumption, becoming perceptible very much later, would be the cause of intolerable troubles in operating, when the supply from the compressor plants is increased too late. Therefore, it is absolutely necessary to transmit a record of the gas supply and the gas consumption—that is, the complete operating condition of all points of the pipeline—to a control room and from there to the compressor plants. For this purpose the development of new methods of measuring temperature, pressure, and volume is necessary. It is impossible to use the old gas meter for measuring such volumes of coke oven gas as are transported by a modern pipe line. Apart from the large gas volume itself, it would be impossible on account of the high pressures employed. Therefore, in modern practice the measurement of gas volume has been carried out almost exclusively by the orifice principle, which, on account of the development of the theory and the perfection of the modern recording instrument, is capable of remarkable exactitude. The measurement of temperature is carried out by the ordinary electric resistance thermometers, and of pressure by spring pressure gauges. All these instruments are installed with recorders, so that the recorded measurements can be transmitted to the above-mentioned control room by electricity.

Along the pipelines telephone cables have been installed by means of which the recording of gas volume, pressure, and temperature is made possible by a multiple telegraph system, with connections from all points of the pipeline to the main control room and from there to the compressor station. Fig. 9 shows, for example, the main control room of the Ruhr Gas Corporation. It is, moreover, possible to communicate with this room by a special telephone system

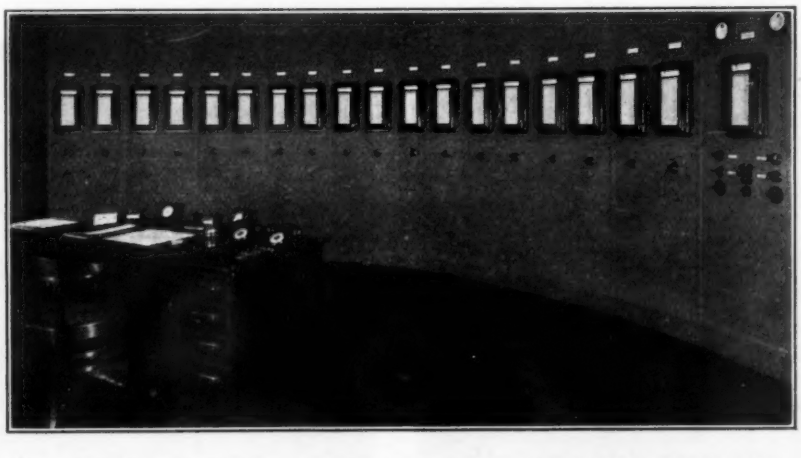
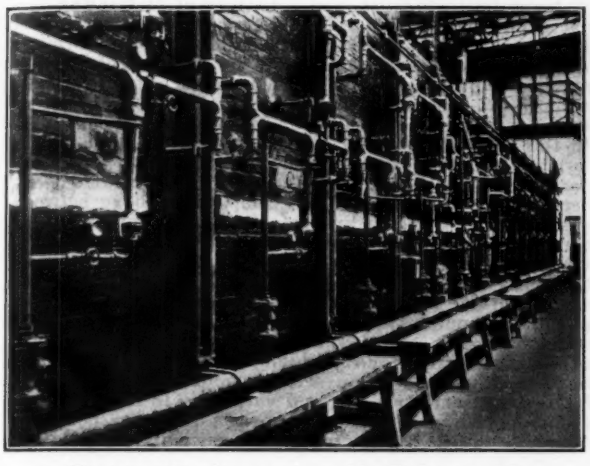


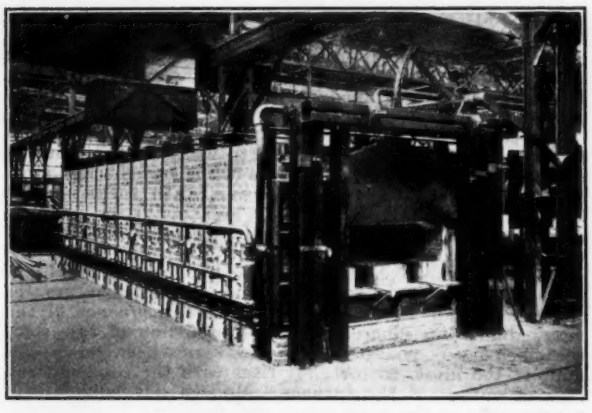
FIG. 9.—VIEW IN THE MAIN CONTROL ROOM OF THE RUHR GAS CORPORATION.

EXAMPLES OF THE GAS-FIRED FURNACES ILLUSTRATED

BY DR. LENT



Heat-treating furnace for cold-rolled materials.



Furnace for the annealing and heat-treatment of welded tubes. The arrangement of the burners along the entire length of the furnace in order to obtain uniform heating should be noted.

through the above-mentioned cables from all consuming points and compressor plants. From this point, the centre of the high-pressure gas distribution system, the whole operation is controlled. This room performs the same function as the switchboard of a big power station by which the distribution of the electric power is controlled.

Fig. 10 illustrates diagrammatically the above-described installation and its operation. This exact control system serves not only for the regulation of the gas supply to the gas consumption, but also as a safety device for the protection of the whole system. By this means trouble in the pipeline, stoppages of the compressor plants, and dangerous losses are quickly recorded and located. Besides this system of measurement control, all pipelines are daily examined along their whole length, a precaution which, although unnecessary in the less inhabited districts of the United States, is quite indispensable in European countries with their dense populations. Thus, each pipeline is divided into sections, and every section is examined by an employee living in the neighbourhood, with the assistance of gas detecting devices—specially constructed instruments—which can indicate very small volumes of hydrogen or hydrocarbons. At fixed points on the pipeline, and particularly on every valve and on every expansion stuffing-box, vent tubes have been arranged to facilitate the discovery of gas leakage. In this manner high-pressure gas distribution has been successfully carried out for the last twenty years without any interruptions or accidents in the whole network of pipelines on the Continent, and especially in the Rhineland Westphalian district. Fuel delivery by a high-pressure gas distribution system, for municipal as well as for industrial purposes, has proved more reliable than long-distance electricity supply. For instance, the lines of the Ruhr coal district have been able at all times to meet their obligations, in spite of several strikes following the war.

As we see in the type of long natural gas lines in the United States, distances of more than 600 miles can be bridged without technical difficulties. That means that under European conditions the coke oven gas demand of the European industrial States can be supplied by the coal districts. In Germany schemes exist which aim at a collaboration between the Western coal districts of Aachen, Saar, and Ruhr, and those of Silesia and Saxony. At all events, an extension of the pipelines of the west to Hamburg in the north, and to Berlin in the east, is to be expected in the near future.

Any description of a high-pressure gas distribution system would be incomplete without a discussion of the requirements at the consumer's premises. Independent of the rise or fall of pressure in the high-pressure lines themselves, the gas must be delivered to the furnaces and burners at a uniform pressure, suitable for furnace and burner conditions. In addition, precautions must be taken against accidents due to leakage. In Germany these installations have been fitted with so-called measuring and regulation plants. Fig. 11 shows a drawing of such a plant for a large consumer. The installation for a small consumer is similar to this, except that it is more economical to use a gas meter instead of an orifice for measuring the gas. For a large gas consumption both the structural and the operating costs are cheaper if an orifice is used; for a small consumption, the gas meter. For the orifice system in fig. 11, the double pipeline system (*f*—*f*) is arranged between the valves (*e*—*e*). These two pipelines are of different diameters. For accuracy of measurement, the larger is used on weekdays with a high consumption, the smaller on Sundays or holidays or by night with a small consumption. In this case the measuring installation is arranged in the high-pressure line before the regulating system. In many cases, when the gas pressure rises higher than 85 lbs. or when a gas meter is used, the reverse arrangement is made—that is, the measurement is carried out in the low-pressure line after passing the regulating system. The automatic control (*c*) itself is a double seat valve controlled by a membrane. This valve is able to reduce the gas pressure from 85 lbs. to 8 in. water pressure. If the pressure is higher than 85 lbs. two such automatic controls are arranged in series. In front of this automatic control, a check valve and safety valve are first installed. The check valve shuts in case of an excessive pressure rise in the low-pressure part, as might, for instance, be caused by an explosion; the safety valve operates in case of excessively high pressure in the low-pressure part and low pressure in the high-pressure part. By these safety devices, proved by successful operation over a period of twenty years, precautions have been taken by which the effect of any accident is localized as far as possible.

The gas pressure on the low-pressure side is in modern practice supplied at 4 to 7 lbs. except in heating open hearth or similar furnaces requiring low pressures from 4 to 12 in. water gauge. With a pressure of 4 to 7 lbs. the installation of the low-pressure pipeline is cheaper, since smaller tubes can be used, and high-pressure burners are applicable, which, if of recent design, are both economical and technically efficient. These modern burners are very simple in construction and operation, the air supply being automatically regulated and controlled by the gas pressure, and combustion taking place in a very short flame. It should be mentioned that a flame as short as possible is necessary for the successful operation of small or medium-sized furnaces, so that gas-heated furnaces may be just as economical as electrically heated furnaces. In considering the possibilities of a high-pressure gas distribution system, both the technical and economic aspects must be taken into account. The question is what is the maximum distance to which one therm of gas can be conveyed so as to compete economically with oil, electricity, and gas manufactured in municipal gas-works from raw coal. Each case must be considered individually. When examining the competition between high-pressure gas and municipal gas, the question arises whether the costs of the high-pressure pipeline and transmission are balanced by the expense of coal transport *plus* the operating costs and capital charges of the municipal gas-works. Under German conditions, all calculations led to one conclusion—namely, that high-pressure gas distribution can compete successfully with municipal gas. The question of oil competition is equally straightforward. Modern oil burners are closely allied to gas burners, so that generally a comparison of costs, gas

therms to oil therms, is possible. If the costs of both are equal, several circumstances favour the use of high-pressure gas.

The combustion of high-pressure gas is carried out with a 10 to 20 p.ct. higher heating efficiency, because the oil flame is longer, leading to greater waste-heat losses, especially in small and medium-sized furnaces. Also in the case of oil, transport is inconvenient, and the price is subject to wide market variations, whereas the price of gas depends purely on the price of coal and is comparatively constant.

The comparison of high-pressure gas and coal is not so easy, because it is impracticable to compare the price of gas per thermal unit with the price of coal per thermal unit. Nevertheless, the use of gas has met with success in all kinds of furnaces of large, medium, and small sizes, in many different industries. The secret of success lies not only in the increased efficiency of combustion, but also in the various savings which attend the use of such a fuel as high-pressure gas, such as saving of labour and material, greater cleanliness, and increased output. In consequence of the many difficulties inherent in the combustion of raw coal, the efficiency of coal-fired furnaces varies between 5 p.ct. and, at the most, 25 p.ct. It rises with the capacity and rate of output of the furnace. Modern developments in the practice of the mechanical and finishing departments, the latest developments in heating practice itself, the increased importance of the quality of the finished products, with a capacity of 45 per hour. The furnace has a hearth of 26·2 by 42 ft., and can be charged with billets 3·5 by 3·5 in. square and 25 ft. long. The coal consumption of this furnace was reduced at full output by 4·5 p.ct.

Other illustrations showed a battery of 24 treating furnaces for heating cold rolled strip materials, where pots 10 ft. high are heated with great exactitude and uniformity. This is accomplished successfully by the use of a large number of burners; also a small portable forging furnace, a most economical and successful appliance for heating small forgings, billets and so on in forges of various kinds. In this case, the thermal efficiency, in comparison with a forge heated by coal, is improved by 90 p.ct. The comparison between high-pressure gas and electric current has been briefly mentioned in the comparison above between gas and coal. The transport of highly compressed gas through a pipeline is more advantageous than the conveyance of electric current to the same distance. While the losses of electric current at a voltage of 220,000 rise to a considerable amount, the gas losses of a high pressure pipeline are never more than 0·5 p.ct., and are practically negligible. The comparison of the transport cost per therm of electric current and of high-pressure gas to a fixed distance is dependent on certain factors, such as taxes, interest and amortization, and variations in load; if these are fixed arbitrarily, the comparison may not be valid. Competition between electricity and gas may be considered

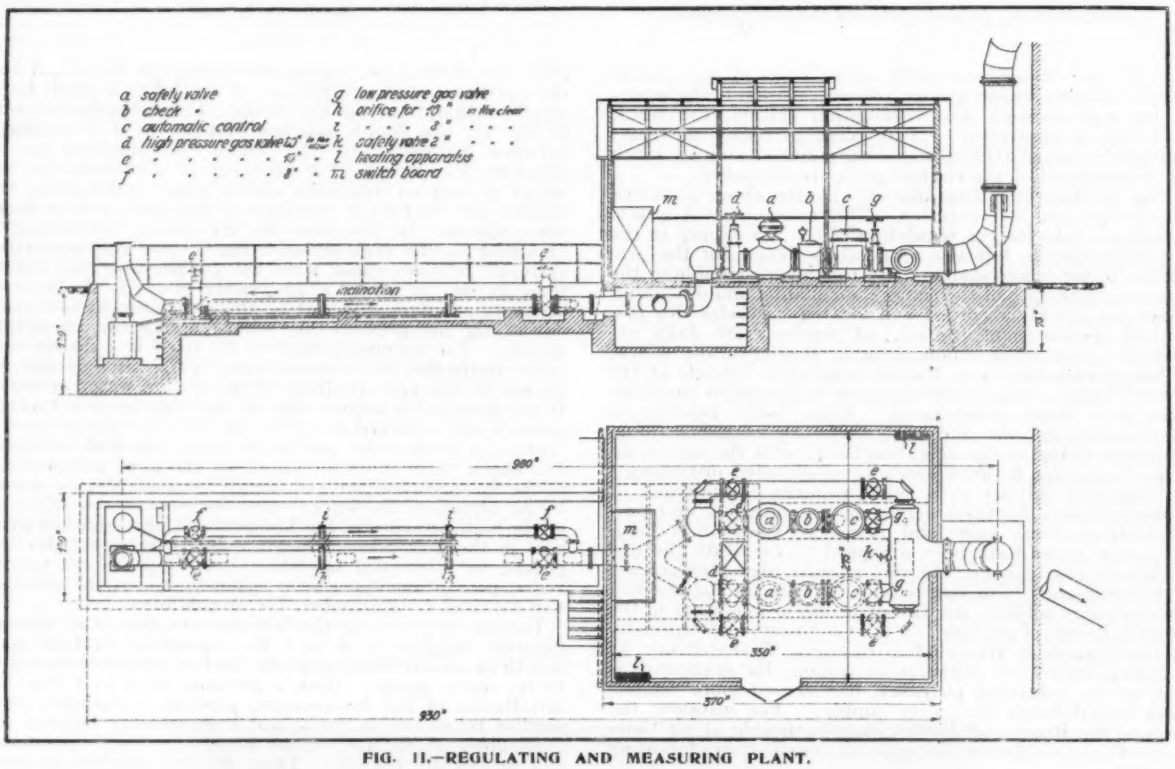


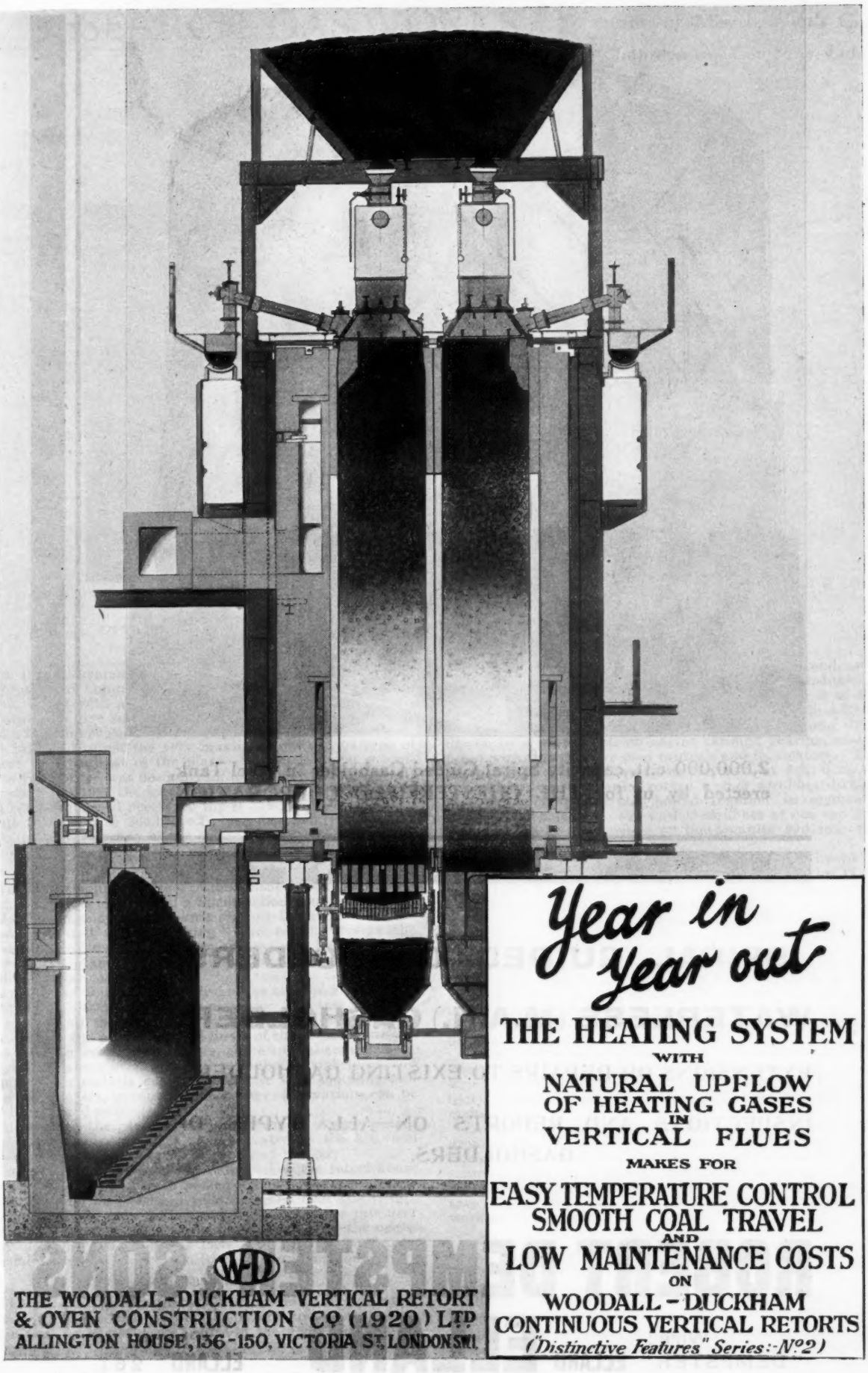
FIG. 11.—REGULATING AND MEASURING PLANT.

and the necessity of fighting against foreign competition where costs of labour and materials are high, have compelled us to devise new ways in order to lower the cost of production. In the post-war period, in cases where there was a lack of fuel, the best results have been obtained by the introduction of rich gaseous fuels, so that in Germany many actually smokeless plants and furnaces are to be seen where raw coal has been completely replaced by gaseous fuel. The expectation that combustion efficiency would be increased by the new gaseous combustion system has been fully realized. The efficiency of an electrically heated furnace was taken as the standard. To-day in a modern furnace, with the air preheated in a recuperator built of non-corroding steel, heating efficiencies of 50 p.ct. to 70 p.ct. are obtained, except in the case of smelting furnaces, where, owing to the unique conditions which have to be fulfilled, efficiencies of only 25 p.ct. to 35 p.ct. are possible. The efficiency of a gas-fired furnace, therefore, now approaches that of a furnace heated by electric current. The conditions of installation and operation, together with the other savings mentioned above, can equal or exceed the advantage derived from a possible higher combustion efficiency.

Some of the slides shown on the screen by the author gave examples of furnaces of various sizes heated by high-pressure gas. First, a continuous furnace for heating billets from another point of view. If, after being conveyed 300 miles, the sale of 35·3 c.ft. of gas is possible at the same price as one kw.h., the gas thermal unit has been bought cheaper in the proportion of $\frac{4300}{865}$. Suppose the efficiencies of a gas-heated furnace and an electrically heated furnace are 50 p.ct. and 75 p.ct., the relative costs of gas and electricity can be estimated, when other operating conditions are the same. German experience in the finishing departments of the wire, cold rolled strip, sheet and tinplate trades, has shown that heating by high-pressure gas is more economical. The estimated savings have always been exceeded.

Admittedly, heating by electric current has certain advantages in small furnaces or in furnaces which must have an exact temperature control; but, generally, heating by high-pressure gas is more advantageous in furnaces of all sizes working under widely varying conditions.

If as a result of the coal production and the industrial conditions of a country a certain quantity of coke is produced, then high-pressure gas distribution is of vital importance both from a point of view of the industry and from the point of view of the State. It is a guarantee that the mineral wealth of the country is being utilized to the best advantage.



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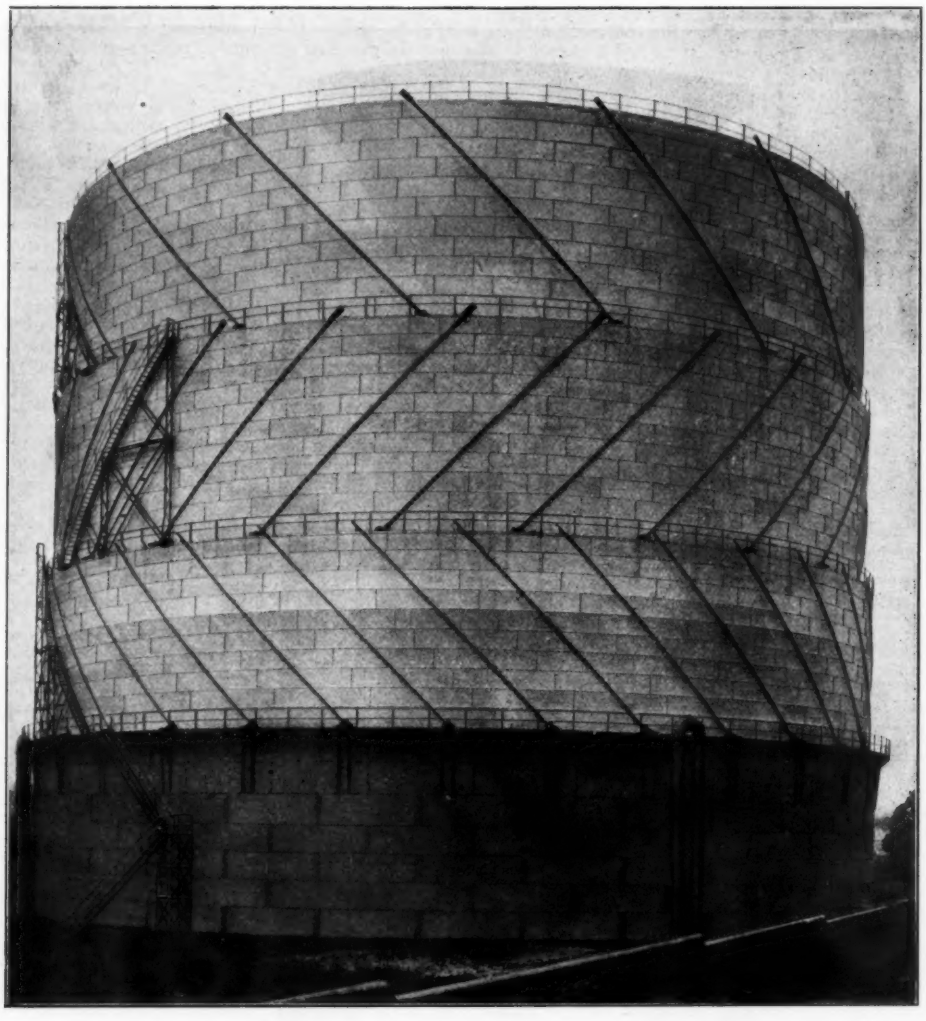

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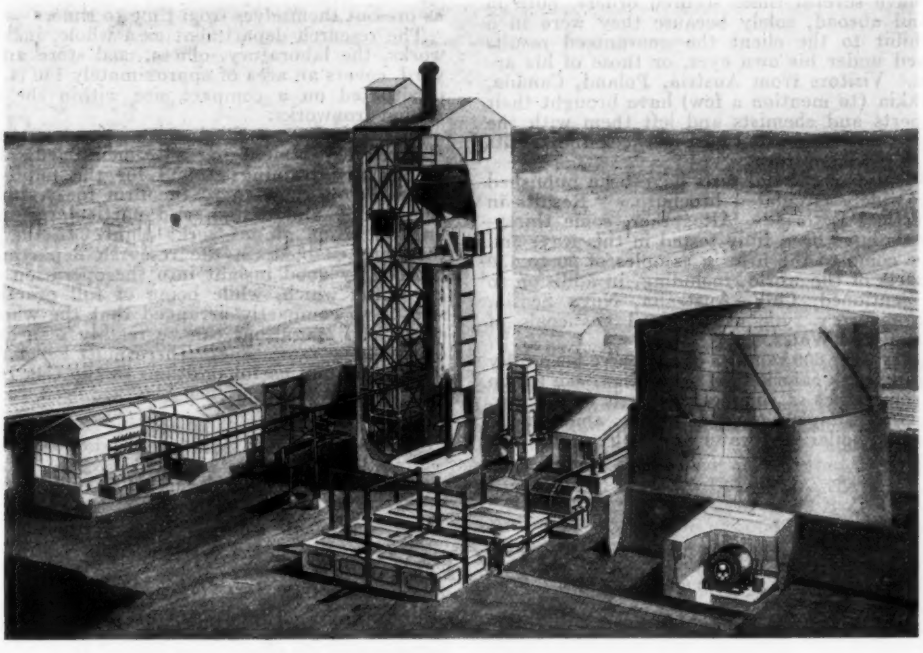
A RESEARCH GAS-WORKS*

Installation at the Albion Ironworks of Messrs. West's Gas Improvement Company, Ltd.



THE RESEARCH GAS-WORKS AT ALBION IRONWORKS.

From left to right are seen the Laboratory, Coke-Handling Plant, Electric Lift, Retort Setting and Coke Extractor, Ancillary Plant, and Gasholder.

In 1923 a beginning was made by Messrs. West's Gas Improvement Company, Ltd., with one standard 40 in. by 10 in. retort with all the usual equipment, and with some additions to give such extra facilities as were necessary to make full observations of every part of the apparatus. It was intended to get the very maximum out of this type of retort, and the rest of the plant—the whole being a complete gas-works—was designed for a capacity of 125,000 c.ft. per day. In 1927 the increases in the size and capacity of the retort rendered necessary the re-design of the ancillary plant to deal with 300,000 c.ft. per day, which compares favourably with many of the works of statutory gas undertakings.

Retort House.

The retort house is a steel-framed, asbestos-sheeted building, in which is also housed a Spencer-Bonecourt waste-heat boiler of capacity more than sufficient to produce all the steam required for "steaming" the retort, driving the exhauster and scrubber engines and tar and liquor pumps, as well as a standby gas-fired boiler on the same principle and of similar capacity.

An adjunct to the retort house is the one-ton electric lift, of standard design (housed in a similar structure), serving to connect all the floors and to elevate coal to the retort and coke to the producer. All floors of the retort house are also interconnected with ladders, and a special arrangement of platforms has been installed to make all sightholes and dampers particularly easy of access, so that sampling and analysis of gases, pyrometer, and other observations can be readily carried out.

All coal to the plant is weighed over an Avery weigh-bridge in a side-tipping wagon, elevated in the lift, and passed through a grid into the overhead bunker.

Coke is discharged into two skips below the retort-house floor level. The skips are picked up by a two-ton electric block running on overhead rails, weighed over the weigh-bridge, and the coke is dropped in the yard for producer feed, or is taken into the works for disposal after the necessary grading and sampling have been carried out on a specially prepared surface in front of the laboratory.

Ancillary Plant.

The gas passes from the top-of-stack down to the retort house governor, then out of the retort house in an 8-in. main passing over the coal store in the yard (acting as a preliminary air condenser) to the vertical water condenser. This is of the rectangular, water-tube type, 16 ft. high by 3 ft. 6 in. square. The exhauster which follows is of the three-blade rotary type, capable of passing 12,500 c.ft. of gas per hour when running normally at 100 r.p.m. It is driven by a vertical steam engine through gearing, and is fitted with the usual by-pass controls and lubricators. The gas passes through a Livesey washer 5 ft. by 3 ft. 6 in. by 2 ft. 6 in., to a horizontal rotary washer scrubber divided into eight compartments, bolted together in segments. Fresh water is fed into the washer scrubber at one end and liquor is made to overflow at the opposite end into the Livesey washer.

The purifiers consist of the two original 10 ft. by 10 ft. boxes, to which have been added two more 15 ft. by 15 ft. boxes (all 5 ft. deep), all interconnected so that any number may be worked in any desired order.

Two station meters are in use, a standard wet meter for makes up to 6000 c.ft. per hour and a rotary meter for higher makes, up to 15,000 c.ft. per hour.

The gasholder, a spirally-guided one-lift holder, is of 12,000 c.ft. capacity and serves for sampling, mixing, and keeping a small reserve of gas. It is fitted with an automatic valve which opens when the holder is above a certain height and allows gas to pass freely out to its points of disposal.

The gas made on the plant is used as far as possible in the works (*i.e.*, Albion Ironworks) and the remainder (under strict control with regard to calorific value and H_2S content) is passed through a governor and meters into the town mains.

Tar and liquor collect for twenty-four hours in an underground tar well and are then pumped to an overhead separator, in which both can be separately measured and sampled prior to disposal. Special attention is paid to by-passing each section of the ancillary plant so that necessary adjustments may be made without disturbing the working of the plant.

Activities.

The plant has reached a maximum output of 289,000 c.ft. per twenty-four hours, with a throughput of over 20 tons per day of a special coal (brown coal briquettes).

The activities and duties of the research department fall into two main categories:

(*a*) Testing and running trials on gas-making coals which are used, or proposed to be used, by clients, so that

* From the May issue of "West's Gas."

guarantees can be based on real knowledge of the behaviour of the coals carbonized under the conditions of the test.

(*b*) Testing-out and developing of all manner of new devices and designs of retorts, producers, extractor gears, coal feeding apparatus, gas offtakes, and everything else connected with the carbonizing plant.

In the former capacity the research department claims that the firm have several times secured orders, both in this country and abroad, solely because they were in a position to exhibit to the client the guaranteed results actually obtained under his own eyes, or those of his appointed experts. Visitors from Austria, Poland, Canada, and Czechoslovakia (to mention a few) have brought their carbonizing experts and chemists and left them with the firm to see their coals carbonized and to check the results for themselves in the laboratory.

The results of most of the full tests have been published in the recently widely circulated brochure. "Results in Glover-West Vertical Retorts." Altogether, some thirty-five different coals have been fully tested in this way, and these coals have come to the firm in samples of 50 to 150 tons from all parts of the world, including, in addition to the countries mentioned, Chili, Australia, Nova Scotia, Japan, as well as every type of standard gas coals of England, Scotland, and Wales.

In the laboratory over 600 samples of coal have been fully analyzed, generally with calorific determination, ash fusion points and, in some cases, a complete analysis of the ash. In addition, many samples of coke, tars, ammoniacal liquors, refractories, boiler feed water and boiler scales, oils and greases, heat-resisting metals and metallic alloys, have been analyzed, tested, and investigated. Indeed, the laboratory is in some danger of becoming a sort of general consulting station on all manner of little problems. The records show that a total of nearly 3000 samples have been examined.

The laboratory is fully equipped with all the most modern apparatus for routine work, and a growing amount of specially devised apparatus for dealing with such problems as present themselves from time to time.

The research department as a whole, including the gas-works, the laboratory, offices, coal store and coke-testing yard, covers an area of approximately 140 ft. by 60 ft., and is situated on a compact site within the boundaries of Albion Ironworks.

In conclusion, a third most important function of the research department must be mentioned. It serves as a preliminary training ground for the pupils of the firm. These young men go to the firm for training in general engineering and design, and particularly in the erection and operation of gas-works plant. In the latter respect they are enabled, in the research department, to get a thoroughly good insight into the operation of a complete gas-works which, while being of full practical scale and size, is so compactly arranged that the whole of the processes and operations can be readily seen and grasped at one and the same time. There must be many young men now occupying useful positions in the Gas Industry whose first gas-works experience was acquired in "West's Research Plant."

"TAMBT."

REVIEWS

WILLING'S PRESS GUIDE.

The 1932 Edition of this useful reference book in no way falls away from the high standard of make-up and accuracy established by previous issues. All the features which have made the guide such a valuable compilation are retained in the new edition, and every detail has been brought up to date. Reference is made to the appearance of new publications and also to amalgamations which have been effected of late. In his Introduction the Editor expresses the hope that the 1932 Guide "will give added prestige to a volume which thousands of regular readers have for years regarded as indispensable." We think his aspiration will be fulfilled. The new Edition, price 2s. 6d., is obtainable from the publishers, Messrs. Willing & Co., Ltd., 356-364, Grays Inn Road, London, W.C. 1.

PITTSBURGH PROCEEDINGS, 1931.*

Reviewed by T. CAMPBELL FINLAYSON, M.Sc., M.I.Chem.E.

The delegates attending the Third International Conference on Bituminous Coal had five days to find their way through the hundred or so papers which were presented for their enlightenment. It is to be hoped that they felt less overpowered than the writer, who is asked to review the Proceedings of the conference in a few hundred words. As twenty entirely different branches of fuel technology were dealt with any review is inevitably inadequate. Therefore, one can but indicate the impression the volumes leave on one's mind.

The first thought is that the conference with its transactions has set out to be a "Super-Conference." The presentation of the volumes brings to mind the Introduction of a Super-Film—elongated pauses while the names of those associated with the film production are thrown on the screen. Before even the list of contents in Volume I. there are given the names of the Advisory Board, the names of the eleven Secretaries to the Conference, and the Chairmen of such Committees as Radio, Hotels, Press, and Physical Arrangements. The success of a conference certainly turns on good organization, but surely this is in the background and not the foreground of the picture.

A further similarity to the "Super-Film" is that almost any subject is introduced which at first sight seems irrelevant, but by some slender thread is found to be attached to the main theme. Thus the Conference is scheduled as an "International Conference on Bituminous Coal," and within its scope must include such widely varying subjects as "Catalysts for high-pressure hydrogenation of phenols and hydrocarbons," "The slag-tap furnace and its effect upon the selection of coal for burning in pulverized form," "Impact mills for the manufacture of powdered coal," "The fluidity of coals softened by heat," "Large water gas generators in Great Britain," "Chemical utilization of methane," and "Coal mine drainage disposal" (the last-named being grouped under the heading "Steam purification").

The second impression which perusal of the Pittsburgh Transactions makes is the paucity of the discussions in relation to the length and interest of the papers presented. To take two examples. Some eleven papers were given on low-temperature carbonization occupying 200 pages in the Proceedings. Now low-temperature carbonization is a subject which attracts the verbosity of fuel technologists like bees to a honey pot. But at Pittsburgh only eight speakers (apart from those presenting the papers) took part. Again, on the subject of gasification—in which category come gas-works carbonization processes—nine papers were given extending to some 180 pages, but only ten delegates contributed to the discussion of the two sessions. The object of an international conference would seem to be mainly to obtain from the delegates their views on the papers presented. If the discussions are not to be the vital part of the meeting, then personal attendance becomes less important.

The third and the most important impression from these two volumes is that unless one reads the actual Transactions as they appear in full, it is not possible to obtain a true picture of the papers presented. Extracts and Summaries have appeared in various of the British Technical Journals, but by sheer limits of space it has not been possible to present them in full with their original illustrations.

Read in their original form there are many papers which command attention. Information is given which it would be almost impossible to find elsewhere. It may be of interest to detail a few of the subjects which are discussed from novel angles and which are of interest to the Gas Industry. Contributions on the subject of low-temperature carbonization are given by Mr. John Roberts, who furnishes results on the Davidson rotary retort; Prof. R. V. Wheeler, who describes the Salerni system; and Ch. Ab-der-Halden, who describes his system as employed in France. Mr. F. Puening presents an unusually interesting contribution to engineering in low-temperature carbonization practice. The subject of coke quality is dealt with in two further papers by Prof. Wheeler—one on oxidation of coal and the second on coal blending. The relation of chemical and physical tests of coal to the coking properties and bye-product yields is summarized by Mr. A. C. Fieldner. These last three papers, while containing a certain amount of previously published work, present

* Proceedings of the Third International Conference on Bituminous Coal, November, 1931. Published by the Carnegie Institute of Technology, Pittsburgh, Pa. Two volumes. Vol. I., pp. 965; Vol. II., pp. 1034.

the subjects in a comprehensive and concise form. Dr. Kurt Baum's paper on fuel economy in German coke plants introduces a technique for determining fuel efficiency on carbonizing plants which well merits study. Dr. M. Barash and Mr. T. A. Tomlinson present data on steaming in continuous vertical retorts, and elaborate the ingenious "West Steaming Curves." Mr. L. H. Sensicle discusses intermittent vertical chambers. Water gas production from powdered fuel is dealt with by Dr. Thau, who describes test results on the Heller system at Berlin. These are but a few of the papers presented. But they may be sufficient to indicate that in the 2000 pages of the Proceedings of the Third International Conference on Bituminous Coal, there is to be found much of interest and much of value. Collectively the papers have undoubtedly added to the bibliography of fuel technology.

*New Process for the Steaming of Retorts**

Abstract Translation of a Discussion

by A. Steding

The author discusses the principles of steaming and describes methods, introduced by the Otto Company, by which the normal practice of steaming may be extended by the cracking of tar introduced into the retorts or chambers with the steam.

The full advantages, as regards maximum increase in the thermal yield, are only obtained when the calorific value of the straight gas is as high as possible and that of the water gas is also at a maximum. On the other hand, excessive temperatures must not be employed for the sake of shortening the period of operation or maintaining the throughput, otherwise degradation of the gas occurs. It is very important in all steaming systems that the steam should be highly superheated. In the case of horizontal chamber ovens, the steam supply should be well distributed over the length of the ovens.

The normal system of steaming results in the dilution of the straight gas with blue water gas, but enhanced thermal yields are obtainable if carburetted water gas is made in the retorts. One method of effecting this is to spray atomized tar with steam into the gas-collecting space above the coke, at the end of carbonization. Alternatively, steam may be introduced below the coke and tar from above the coke. Suitable means are provided to constrain the tar mist to penetrate into the coke mass.

The calorific value of the carburetted water gas may be 375 B.Th.U. per c.ft. when vertical chamber oven tar is employed or 420 B.Th.U. per c.ft. or upwards if tar oils are used. The amount of tar may be from 1·3 to 1·55 gallons per 1000 c.ft. of carburetted water gas produced, the corresponding figures when heavy oils are used ranging from 1·25 to 1·55 gallons.

It is to be noted that the production of 1000 c.ft. of carburetted water gas requires only approximately 80 p.ct. of the expenditure of heat required for the production of a similar volume of blue water gas, since the cracking process consumes less heat than does the endothermic water gas reaction. On the basis of carburetted water gas of calorific value equal to 375 B.Th.U. per c.ft., the heat consumption is 67 B.Th.U. per c.ft. as against 82 B.Th.U. for blue water gas. The consumption of steam and coke is smaller in the case of carburetted water gas production, and a further reduction in the amount of coke required is caused by the fact that some of the water gas is obtained from the coke formed from a portion of the tar.

The following table compares the results obtainable by straight carbonization, steaming, and steaming in conjunction with introduction of tar:

	Straight Carbonization.	Steaming from Below. No Tar.	Steaming from Below and Tar Injection Above.	Steaming from Above and Tar Injection Above.
Therm yield per ton of raw coal (12 p.ct. moisture + ash) by straight carbonization	66·5	66·5	66·5	66·5
Available tar yield, p.ct. on coal	4	4	..	..
Gas yield c.ft. per ton (30 in., 60° Fahr. satd.) (*a*) Carbonization	12,200	12,200	12,200	12,200
(*b*) Blue water gas	..	7,540	5,160	10,280
(*c*) Carburetted water gas	..	..	5,120	
(*d*) Total	12,200	19,740	22,480	22,480
C.V. of the mixed gas (30 in., 60° Fahr. satd.)	545	450	450	450
Total therm yield per ton of coal	66·5	88·8	101·2	101·2
Straight coke yield (4 p.ct. H_2O, 11·2 p.ct. ash), p.ct.	71·45	71·45	71·45	71·45
Coke consumed for B.W.G., p.ct.	..	5·14	4·23	4·23
Coke consumed for C.W.G., ,,	..	..	2·52	2·52
Theoretical coke yield ,,	71·45	66·31	64·70	64·70
Actual coke yield* ,,	71·45	68·40	66·70	66·70
Coke used as fuel (p.ct. on coal) Straight carbonization	13·60	13·60	13·60	13·60
Steaming	..	1·46	1·46	2·62
Coke for sale, p.ct. on coal	57·85	53·34	51·64	50·48
Steam employed, p.ct. on coal	..	9·0	11·6	11·2
P.Ct. increase in gas make over straight carbonization	..	61·9	84·2	84·2
,, ,, ,, ,, ,, normal steaming	..	..	13·85	13·85
Saleable therms (gas, coke, tar) per 100 therms in the coal	79·0	82·4	80·1	79·0
Cost of gas (coal, 20s. + steam, 4s. − coke, 25s. − tar, 30s. per ton) Pence per 1000 c.ft.	4·3	3·5	4·0	4·2
Pence per therm	0·78	0·79	0·89	0·93

* The coke yields are higher than the theoretical figures due to formation of water gas from scurf.

The table is based on certain arbitrarily assumed values for coal, coke, and tar, but the author considers also the effect of different relative prices of coal, coke, and tar on the net cost of production of gas. Variations in the value of tar have but slight effect, the main factor being the relative values of coal and coke.

The new process is very flexible, since it enables the quantity of coke for sale to be reduced when the coke market is unfavourable. It also enables peak demands for gas to be met, in some cases, without the need for starting up an additional setting. These advantages may render the process attractive even under conditions in which the net cost of gas per therm is, as in the above table, greater when the tar cracking system is employed.

* "Das Gas- und Wasserfach," 1932, **75**, 374-381 (May 14).

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Society of British Gas Industries

ANNUAL MEETING AND DINNER

The Annual General Meeting and Dinner of the Society of British Gas Industries were held at the Hotel Metropole, London, on Thursday, May 26. The PRESIDENT (the Rt. Hon. Lord Eustace Percy, M.P.) was in the chair at both functions.

ANNUAL GENERAL MEETING.

After the minutes of the last annual general meeting had been confirmed and signed, the Council's Report for 1931-32 was presented by Dr. E. W. Smith, Chairman of the Council.

REPORT OF THE COUNCIL FOR 1931-32.

In the first place, the Council has to record with sincere regret the passing away of one of the Society's distinguished Past-Presidents, Sir Arthur Duckham, K.C.B., G.B.E., who rendered such valuable service to the Society and the whole Gas Industry.

It has also to record with regret the death of the following members:

Sir Henry Cowan, Chairman, Parkinson & Cowan, Ltd.
Percy E. Beaumont, Head of W. G. Beaumont & Son.
Albert V. Derry, Managing Director, Koppers Coke Oven Company, Ltd.

The Society offers its congratulations to its President, Lord Eustace Percy, and to two of its Past-Presidents, Viscount Ednam and the Marquess of Hartington, on their election as Members of Parliament.

The Society desires to offer its congratulations to its Chairman, Dr. E. W. Smith, C.B.E., on his election as a Member of the Council of the Institution of Gas Engineers.

The Society is much indebted to its President, the Right Hon. Lord Eustace Percy, M.P., for the very able and valuable address he presented at the last annual meeting, in which he reviewed the industrial situation and suggested how the problems might be solved.

Central Gas Safety Advisory Board.—The Society has co-operated with the other bodies in the Gas Industry in the constitution of the Board on which it has five representatives. The Board has set up a Committee on Geysers on which the Society has two representatives. Considerable progress has been made in connection with this matter. Further meetings will be held and the findings of the Committee's investigations will be reported to the Council in due course.

British Commercial Gas Association.—Congratulations are offered to the Association on their very successful Conference, held at Exeter in September, at which many of the members of the Society were present. The Society is represented on the Gas Commercial Education Committee, to whom has been entrusted the administration of the Commercial Education Scheme.

British Industries Fair, Birmingham, 1932.—Gas Industries Section.—The Society again took an active interest in the Gas Industries Section at the British Industries Fair, Birmingham. Dr. E. W. Smith acted as Chairman of the Gas Industries Section Committee, on which the Society was very strongly represented. Many individual members took space in the Section, and in this very practical way gave it full support. The Gas Industries Information Bureau, erected last year in conjunction with the British Commercial Gas Association, again formed a prominent central figure in the Section. Various improvements were made in the Bureau, including a fountain of hot water, which attracted much attention, and served as an opening for sales talks by the attendants. The services of the attendants were freely given by prominent gas undertakings, and the Industry is indebted to these undertakings for loaning their salesmen at such a busy time of the year.

The Joint Gas Conference was arranged in the second week of the Fair. The sudden death of Sir Arthur Duckham, who was to have acted as President of the Conference, necessitated last-minute alterations being made. At very short notice Sir David Milne-Watson, LL.D., D.L., kindly consented to act as President and deliver a Presidential Address on the opening day. Mr. J. Herbert Canning, O.B.E., the President of the Institution of Gas Engineers, was Chairman for the second day, and Mr. Frank West acted in a similar capacity on the third day. The address on the second day was by Mr. W. J. A. Butterfield, M.A., on "Ten Years of the Therm." The attendance at the Conference was very encouraging. An official gas luncheon was held on the first day, and on the second day the delegates were entertained at luncheon by the Fair Management Committee. During the first week of the Fair official visits were paid to the Fair by members of the Joint Junior Gas Associations, and also by members of the Gas Salesmen's Circles.

There was this year a large increase in the number of visitors to the Birmingham Section of the Fair, and the increasing popularity of the Fair makes it all the more necessary that the Gas Industry shall be adequately represented. The Society's policy of continued support to the Section is bearing fruit, and the importance of the Fair is being more and more fully recognized by gas engineers.

The Society is very much indebted to the Birmingham Corporation Gas Department for their co-operation and support,

LORD EUSTACE PERCY, M.P.
President of the S.B.G.I.

and to Mr. R. J. Rogers for his valuable services as Hon. Secretary.

Third International Conference on Bituminous Coal.—At the Conference at Pittsburg in November, Mr. N. E. Rambush, General Manager of Ashmore, Benson, Pease, & Co., Ltd., presented a paper on "Large Water Gas Generators in Great Britain."

British Engineering Standards Association.—The Association has recently set up a Technical Committee on Fans, on which the Society is represented.

Building Centre.—Members of Sections 6, 7, and 8 have discussed and approved a co-operative arrangement with the Gas Industry in connection with the Building Centre, to be opened in Bond Street, London, and have agreed to take an active and financial part in supporting this movement. The Centre is being established for the mutual benefit of architects and manufacturers of materials and equipment and all those engaged in the building industry, and to stimulate public interest in building.

Foreign Contracts and Variations in Currencies.—The Council has had this matter under consideration and has drawn up clauses for the guidance of the members.

Joint Lighting Committee.—At the suggestion of the Society an important Committee has now been set up on which the various bodies in the Gas Industry are represented, and it is hoped that much useful work will be the outcome.

International Illumination Congress.—The Congress, at which the Society was well represented, was a pronounced success. The flood-lighting of London and important provincial centres was an outstanding feature, and was an object-lesson of the value of gas for illumination. Some important papers were contributed by the Gas Industry, and the Society presented a paper on "Lighting of Factories and other Large Buildings." The Society is indebted to the Editorial Staff of the British Commercial Gas Association for the valuable assistance given in the preparation of the paper.

British Glass for Gas Lighting.—The Council has taken up the question of the importance of British glass for gas lighting with the Society of Glass Technology and the Glass Manufacturers' Federation, and the matter is being thoroughly investigated.

Retort Setters.—The Manchester Agreement between Section 1 and the Amalgamated Union of Building Trade Workers has continued to work satisfactorily.

Gasholders.—The Sub-Committee appointed to draw up regulations embodying safety precautions to be observed by contractors when carrying out repairs to gasholders has completed its recommendations and submitted them to the Home Office for consideration.

Gas Meter Testing.—The Meter Section has been dealing with the question of the difficulty caused by certain regulations and proposed regulations with regard to the stamping of gas meters. The representatives of the Section have been in touch with the Institution of Gas Engineers and the London County Council, and negotiations with those bodies are still in progress.

Refractories.—The interest in refractories during the past year has been well maintained, as shown in the proceedings of Section 10, who have held several meetings for discussion of important matters connected with the same, notably on the question raised by the British Standards Institution with reference to the standardization of horizontal retort sizes. This matter was also discussed at a joint meeting of Sections 1 and 10, when it was decided that the standardization of horizontal retort sizes is impracticable and inadvisable. Much interest is being taken by the Section in a proposal that the present Standard Specifications for Refractory Materials for Gas-Works should be amended and brought up to date with a view to their adoption by the British Standards Institution. The matter is now under consideration by the Refractory Materials Joint Committee.

The members of Section 10 have also had in review the work done during the year by the other Societies, such as the British Refractories Research Association, the Ceramic Society, and some of the University Science and Research Departments.

An interesting event was the annual meeting of the Ceramic Society, held in London in November last, when several papers on refractories were brought before the meeting, and in the discussion of which many members of the Section took part.

At the annual dinner of that Society in the evening many members of this Society were present, with Lord Eustace Percy, M.P., as principal guest.

Coal.—The relations of members of Section 14 with the Gas Industry generally have remained throughout the year of a cordial character, no matters having arisen that do not lend themselves to amicable adjustment as between the parties concerned.

City and Guilds of London Institute.—The Society's Prizes in last year's Examinations of the City and Guilds of London Institute in Gas-Works Practice, Gas Supply Practice, and Gas Fitting have been duly awarded and announced in the Technical Press.

The Society wishes to accord its best thanks to the Right Hon. Lord Eustace Percy, M.P., for his able and valuable services as President during the past two years.

The Society is much gratified that on his retirement he has been pleased to accept the office of a Vice-President, and hopes for many years to have the benefit of his counsel and advice.

It also desires to place on record its best thanks to Dr. E. W. Smith, C.B.E., Chairman of the Council, for his able address dealing with the immediate problems before the Gas Industry as a whole and putting forward a number of new suggestions, at the autumn meeting in November, which led to a good discussion.

The Council has much pleasure in announcing that the Right Hon. L. S. Amery, M.P., has accepted the Presidency of the Society for the coming year.

On behalf of the Council,

E. W. SMITH,
Chairman.

Dr. E. W. SMITH, C.B.E., moved the adoption of the Council's report for 1931-32.

Referring to the paragraph on refractory materials, he said that the whole question of refractories was one of great importance to the Gas Industry. There was no more important subject than to improve the quality of refractories, and at the present time there was a danger, owing to the call for economy by the Government, of the withholding of their grant, or reducing their grant, towards research work. Dr. Smith said that he was one of those who believed that if this work did not receive support from the Government, it was vitally necessary that those who were interested should give their support and make up what the Government had withdrawn—and more. He felt very strongly that this work on refractories should be independent of the Government and should receive more support in order that more work might be done. He was sure he had the strong backing of the refractories section of the Society in making these remarks.

In regard to the section on coal, said Dr. Smith, an interesting thing had happened during the year—that was, a demand on the part of certain sections interested in the uses of coal for standardization and classification of coal. That demand had been considered by the British Standards Institution, and owing to the difficulty of getting all interested to agree that such classification was possible and necessary, the idea of standardization had been dropped for the time being. Any of them who were interested in this subject would realize what great dangers there were in attempting to classify coals. Those who appreciated this had disagreed in the matter coming forward, and consequently this standardization was not proceeding.

Mr. E. J. FOX, M.I.Mech.E., seconded the resolution for the adoption of the report, which was agreed to.

It was proposed by Mr. F. J. GOULD and seconded by Mr. FRANK WEST, M.I.Mech.E., that the accounts for the year 1931 be adopted. This was carried.

The PRESIDENT announced that the following had been elected to serve on the Council as representatives of the Sections:

Mr. W. H. Handley	Section I.
Mr. T. A. Clapham	,, II.
Mr. Charles S. Bennett	,, III.
Mr. Leonard Hartley	,, IV.
Mr. Albert J. West	,, V.
Mr. H. M. Thornton	,, VI.
Mr. H. A. Hobson	,, VII.
Mr. T. F. C. Potterton	,, VIII.
Mr. John Orme	,, IX.
Mr. W. J. Gardner	,, X.
Mr. B. B. Waller	,, XI.
Mr. Thomas O. Wilton	,, XII.
Alderman George Clark	,, XIII.
Mr. Alexander Comley	,, XIV.
Mr. Douglas W. Turner	,, XV.

Dr. E. W. SMITH then moved the election of Mr. E. J. Fox, M.I.Mech.E., as Chairman of the Council. It was not necessary, he said, for him to tell them anything of Mr. Fox. It was remarkable that a Society of this nature should feel that it was of sufficient standing to be able to get a man of Mr. Fox's position, interests, and activities to become Chairman. They were very proud that it should be so. He had attended all their meetings as Vice-Chairman during the past year and had taken a great interest in all that had been done and had been very helpful in difficulties on some matters; and he had every confidence that Mr. Fox would be a wise Chairman and would be of considerable assistance not only to the Society but to the Gas Industry as a whole.

Mr. H. E. BENNET, M.C., seconded the resolution, which was unanimously carried.

Mr. FOX, in acknowledgment, said he was very grateful to them for this compliment they had bestowed on him. At the same time he made no secret of the fact that he took office with feelings of some timidity. He realized that he was following in Dr. Smith an individual whom it would be very difficult for anyone to follow—and these were no mere words of platitude. He realized that the subjects and interests represented by those present in that room on that occasion were so diversified that they did present difficulties greater than those confronting any technical society. He looked forward with the greatest pleasure to continuing his associations with the Industry, and he thanked them most sincerely for the great compliment they had paid him.

On the proposition of Mr. B. B. WALLER, A.M.Inst.C.E., seconded by Mr. G. R. D. BURN, Mr. Bennet was elected Vice-Chairman of the Council.

Mr. BENNET said he was indebted to them for this high compliment they had paid him.

Col. E. A. WILSON, M.C., T.D., proposed, and Mr. W. J. GARDNER seconded, the re-election of Mr. F. J. Gould as Hon. Treasurer of the Society.

On the proposition of Mr. ERNEST WEST, Mr. E. J. Davison was unanimously re-elected Hon. Secretary.

Mr. R. B. HODGSON, M.I.Mech.E., proposed, and Mr. LEONARD HARTLEY, M.I.Mech.E., seconded, the election of Dr. E. W. Smith and Mr. Ernest West as elective members of the Council, which was agreed to.

The re-election of Mr. C. A. Goodall and Mr. Frank West as elective members of the Council was carried on the proposition of Mr. R. J. MILBOURNE, seconded by Mr. E. J. DAVISON.

Mr. JOHN ORME proposed, and Mr. C. S. BENNETT seconded, the re-election of Messrs. Cash, Stone, & Co., as Auditors of the Society. This was agreed to.

Mr. CHARLES CLARE then proposed a vote of thanks to the Council for their services during the year, which was seconded by Mr. J. WINSON SCOTT and carried unanimously.

Dr. SMITH briefly returned thanks on behalf of the Council.

Thereafter, Dr. SMITH moved a vote of thanks to the Hon. Treasurer, the Hon. Secretary, and the Secretary for their services during the past year. This was seconded by Mr. T. F. C. POTTERTON and carried unanimously.

PRESENTATION TO MR. R. J. ROGERS.

Dr. SMITH said that he had now a very pleasant duty to perform. Mr. R. J. Rogers had been the Hon. Secretary of the Gas Section of the British Industries Fair at Birmingham from its inception; they were very proud that the Gas Section had led the way in British industry in showing how to carry out a composite exhibit and demonstration as to what a particular British Industry was doing. But they did not intend to take the credit on themselves. For the bulk of the credit for the success of the Gas Industries Section at the British Industries Fair at Birmingham would go by unanimous agreement to Mr. Rogers. They were very fortunate in obtaining the collaboration of the Birmingham Corporation Gas Department, and they were fortunate in having Mr. Rogers on the staff. There had been the greatest competition and the possibility of considerable jealousy among exhibitors in regard to the position of their displays; but everyone had trusted Mr. Rogers without question, and as a result the Fair had been an enormous success. When it was learned that Mr. Rogers would have to give up his Secretaryship owing to the fact that he had become Managing Director of a large industrial firm—an appointment on which they congratulated him—all the exhibitors in the Gas Section unanimously agreed that Mr. Rogers should be given something as a token of their thanks and esteem. Mr. Rogers had stated that he would like with the gift to purchase some pieces of old furniture. Dr. Smith said he had much pleasure in making this presentation to Mr. Rogers in the form of a cheque.

Mr. ROGERS, in returning thanks for the gift, observed that it was exceedingly difficult for him to find words suitable to thank them for this tangible expression of their goodwill towards him. Dr. Smith had mentioned that the bulk of the credit of the Gas Industries Section was due to him; but he thought that too large a measure of this credit was given to him, and he wanted to pay a tribute there and then to the Society and the Industry as a whole for the part they had played, and also to the Birmingham Gas Department and their General Manager and Secretary, Mr. A. W. Smith, for their generosity in allowing him, a servant of the Corporation, the necessary time to carry out his duties. His task had been easy because of the goodwill which every exhibitor expressed, and he knew of no other industry in which this co-operative spirit existed as it did in the Gas Industry. He hoped that future Hon. Secretaries would have the same support that he had had. In accepting this tangible token of their goodwill, he would like to say how much he was indebted to his old assistant, Mr. W. L. S. Spinks, and others. He assured them that he had not carried out the whole of the work himself. In taking this gift it was his desire to purchase something he could look at for many years to come and by which he could remember the cordial relationship which existed between himself and the exhibitors at the British Industries Fair.

PRESIDENTIAL ADDRESS

OF

The Right Hon. Lord EUSTACE PERCY, M.P.

ECONOMY IN SOCIAL SERVICES.

Eighteen months ago I inflicted on you at luncheon an address on Government economy. That subject is certainly not of less interest to industry to-day than it was then, and I hope you will allow me to choose this again as the subject of my farewell address to you from this Chair, with which you have honoured me for the past two years.

I do so because I am convinced that neither industry nor the public—nor, if I may say so, the Government—have faced the real implications of the present demand for economy. The failure of so many campaigns for economy in the last ten years has not been due to ill-will or incompetence in those responsible for Government expenditure; it has been mainly due to the fact that the public, including business men, have persisted in the belief that you can have a revolution in public administration without a revolution in social life. The attitude of the professed economist has too often been that of a late colleague of mine in Parliament who once told me that there were many too many secondary schools in the country, and then, in the next breath, informed me that it was the settled policy of his business never to engage even an office boy unless he had passed the First Schools Examination.

I say, a revolution in social life. This is something much deeper than a mere change in policy. We need a change in our whole way of life as a people. Let me take education as my first example.

The campaign for economy in education has generally been based on two assumptions: one, that the policy of successive Governments has been to provide constantly increasing grants to local authorities in order to encourage them in educational extravagance; and, secondly, that this country is spending far more than any other on education. Now neither of these contentions is supported by the facts.

Take the first one. What has been happening in the last ten years? In 1923-24 the expenditure out of the central Exchequer on all branches of education controlled by the Board of Education in England and Wales, excluding pensions for teachers under the contributory superannuation scheme, was about £40,900,000. The comparable figure in the Board of Education's estimates for the present financial year is £40,448,000, so that, if we exclude teachers' pensions, central expenditure has actually declined since the period when the Geddes axe was in full operation. But, in this same period, the total expenditure by local authorities on elementary and higher education (again excluding all expenditure in connection with teachers' pensions) has increased by over £9,000,000 from £67,596,000 to £76,755,000. These figures include the grants from the central Exchequer, but the fact seems to be that practically the whole of this increase of £9,000,000 has fallen upon the rates.*

This growth of local expenditure on education, it will be observed, has taken place in spite of the recent cut in teachers' salaries and the previous reduction which took place in 1925. In fact, the local authorities' bill for teachers' salaries has fallen by over £2,000,000 during this period, in elementary schools alone, so that the growth in local expenditure on other educational objects has increased by something like 11½ millions. The really serious fact which emerges from these figures is that central expenditure on education reached some time ago the limit at which it could be maintained, and whenever there has been a tendency for that figure to rise some action has been taken which has, in effect, transferred the burden of the growing expenditure to the rates. In spite of this, the expenditure out of rates has continued to increase, owing, broadly speaking, not to pressure from the centre, but to local demand.

A COMPARISON WITH CANADA.

Turning now to the other contention that we are spending more than any other country, I will only give one comparison. As Sir Donald Maclean stated the other day, we are spending in Great Britain as a whole, including Scotland, a little under £100,000,000 a year out of public funds on all grades of education from the University down; but the corresponding figure for Canada is about $150,000,000, a substantially greater sum per head of population. It is impossible to convict ourselves of extravagance by comparisons of this kind.

But let us approach the problem from a rather different point of view. In 1930-31 the total expenditure in Great Britain from all sources—public and private—on universities and schools aided in any way by the central Exchequer, including teachers' pensions, was, in round figures, £110,000,000. This excludes the expenditure of public, preparatory, and private schools, and all other purely voluntary forms of education; but for our present purpose these must be left in a separate category. It also excludes the expenditure of the Colleges at Oxford and Cambridge, but the figure of £110,000,000 is sufficiently accurate for our purpose. Of this, some £98,000,000, or nearly 90 p.ct., came from public funds, £55,000,000 from the central Exchequer, and £43,000,000 from local taxation.

Now to return for a moment to the Canadian comparison, there is one remarkable thing about these figures. The $150,000,000 of Canadian public expenditure is rather more than 90 p.ct. of the total expenditure on the universities and schools concerned, but of this sum more than $120,000,000 came from local (as distinct from Provincial) taxation—*i.e.*, more than 80 p.ct. as against less than 45 p.ct. in Great Britain. What is the meaning of this contrast? How is the local ratepayer in Canada able to shoulder a burden of education rates more than twice as heavy as that borne by the English and Scottish ratepayer? Why is it inconceivable that anyone should propose the doubling of local education rates in Great Britain?

The answer to this question goes to the root, it seems to me, of the whole problem of economy. The answer surely

* The net annual burden of teachers' pensions on public funds for this period has risen from about £540,000 to about £3,640,000. The latter figure somewhat exaggerates the real growth of the liability, as it represents pensions paid on old rates of salary, *less* contributions received on the present reduced rates. Teachers' contributions are not funded, but are taken each year as a grant-in-aid.

is that a local education rate in Canada, outside a few great cities, is a very different thing from an education rate in Great Britain. It is not a tax imposed by a highly organized County Council with a budget of hundreds of thousands of pounds, administering the schools over the heads of school managers and parents. It is, rather, an intimate local levy made by the school managers of a small " section " (small in population if not in area) in aid of a school in which practically every person who pays the levy is directly and immediately interested. The unit of education is the school, the unit of administration is, in effect, the school managers—the board of school trustees. We are back in the atmosphere of the Scottish parish school of two hundred years ago; a school which, though owing its existence and its status to compulsory legislation, is nevertheless the expression of a spontaneous co-operative effort by a community of neighbours. The parish or township or " section " is rather the natural unit of social co-operation than a grade in the hierarchy of local government. We have, in short, voluntary effort just at the point where it is beginning to turn into Government action.

Influence of Voluntary Effort.

Now it is true that voluntary effort can never be arrested at this point. The Canadian system of local education, like that of the United States, has grave disadvantages, penalizing as it does the poor school district, and it is just beginning to be modified, as it has already been modified in a number of the American States, by a system of centralized grants. But both Canadians and Americans are keenly conscious that, in proportion as considerations of efficiency drive them to consolidate schools, to substitute the county for the district as the unit of education, and to institute a system of central grants from the Province or the State, they are embarking on a road which ends eventually in a blind alley. The fundamental fact about the administration of a social service is that both economy and the prospect of progressive development depend on the existence of a great volume of voluntary effort, such as can only express itself in comparatively small units, in a comparatively small local area, or in a comparatively small non-local association. The moment that administration and finance become organized in units too large to enlist such voluntary effort, economy in its true sense must, to a large extent, be sacrificed, and progress will be limited, and eventually arrested, by the impossibility of raising taxation beyond a certain point.

In fact—and it is vital to insist on this—economy in its true sense consists not in an attempt to reduce the volume of social services—to educate fewer people or to build fewer houses, nor even in an attempt to spend less money on those services; but in the difference between financing those services out of taxation and financing them out of subscriptions. " Subscription " is, after all, a more accurate name for a local parish education levy than taxation. In this or that direction it is always possible to run a service more cheaply, and in times like these it is necessary; but the reason why the burden of the social services in this country is impossibly heavy is mainly that we are spending necessary money through the wrong channel, the impersonal channel of government instead of the personal channels of voluntary effort. The principle on which we conduct our social services at present is the principle of impersonality. It is, we say, the duty of the State to educate—the State, not the parish or the district; the unit of politics, not the unit of neighbourhood. It is the duty of the State to maintain the unemployed—again, the political unit, not the trade unit of the industry or the trade union, nor the local unit of neighbourhood. Since the war we have even begun to regard it as the duty of the State to house the mass of the people. So long as this principle governs our action, so long must we fail to secure either economy or progress. The really grave question is whether we have gone too far in this direction to draw back, whether our enormous and over-crowded population has become incapable of organizing itself for social objects in comparatively small units, whether we are condemned to the rigidity of a semi-socialistic State. The only true economist is the man who refuses, in spite of all undoubted signs to the contrary, to despair in this way of the commonwealth. I believe we can reverse our present tendencies, though it will be a long and infinitely difficult campaign. That reversal is the only adventure which remains open to us in the field of politics, the only constructive task to which it is worth while for the young man in politics to devote his life.

Arrest the Tendency towards Impersonality.

The first step in this political adventure must, of course, be to arrest our present tendency towards impersonality at the points where it has not as yet gone too far. One of the most discouraging features in present Government policy is that we have as yet made no coherent attempt to arrest this tendency in the matter of housing. We have, indeed, begun to limit our conception of the " duty of the State " by considering whether we cannot confine housing subsidies and control over rents to the smallest type of house; but a real return to sanity in housing will be impossible unless we can definitely transfer the responsibility for housing the people to the shoulders on which it should properly rest—namely, to that voluntary business association, the building industry. It may always be the duty of the State to subsidize those who cannot afford to pay an economic rent for a decent house, but this is a poor law function to be conducted on poor law lines. If the impersonal State goes outside this poor law sphere, the effect of its action in housing is, in the long run, to limit the number of houses built by the capacity of the ratepayer and taxpayer to bear the cost of housing subsidies. Every successive piece of legislation for slum clearance, for instance, has broken down because it merely provides for some slight re-handling of the limited sum which can be raised by rates and taxes for this purpose. All this legislation only serves to encourage the building industry in the delusion which seems to have been growing upon it in recent years, that an economic rent is a divinely-appointed sum of money to be fixed by the building industry to suit its wage scales, its methods of organization, and the profits to which it thinks itself entitled. That is, of course, absurd. The economic price of any article is always fixed by the consumer quite as much as by the producer, and the economic price at which houses must be produced is determined at any given moment by the earnings of the mass of the people far more than by the wages of the building trade workers. The real duty of the State in the matter of housing is to insist that the building industry, its employers and workers, shall so organize itself as to satisfy the demand for houses at the demanded price. If we announce that we will not give protection to inefficient manufacturers, neither must we give subsidies to an inefficient building industry.

But there is undoubtedly a serious difficulty in restoring " private enterprise " in housing. That difficulty is that in the last twenty years the small unit of *demand* for houses, represented by the small urban investor in house property and the agricultural landlord, has to a large extent been extinguished. We have, it is true, in the same period, had a great growth in voluntary co-operative demand for houses through the building societies, but these societies serve a somewhat different class of householder. This decay in the voluntary local organization of demand tends to produce, as an inevitable consequence, a corresponding decay in the small unit of supply, the village builder and the small speculative builder. A highly " rationalized " building industry, great as would be the benefits it would confer on the nation, would not be able to replace this loss, any more than a highly " rationalized " administration of poor law services by a County Council under the Act of 1929, however necessary it may be, can replace the more intimate and flexible poor law administration of a rural Board of Guardians.

The Self-Governing School.

It is this difficulty of recreating, in the overcrowded life of to-day, units small enough to embody active personal social co-operation, as distinct from impersonal social administration, that forms the main obstacle to Government economy in social services. This obstacle is especially formidable in the most expensive and unsatisfactory of our social services, the relief of the unemployed. The best prospect of surmounting it in this field probably lies in reviving the trade union as an organ of social co-operation, instead of restricting it, as we have increasingly done in recent years, to the function of conducting industrial warfare. But there is one social service in which we do not need to create or recreate the small unit for which we are seeking, for we already have it. That service is education, for there we have the unit of the school. The school at present tends to be lost in the luxuriant growth of central and local administration and inspection, but it has behind it the great English tradition of the self-governing school, and even the smallest elementary school has become increasingly conscious of this tradition in recent years. Can we not in education show the way back to a true economy in social services?

Obviously this is not the occasion for a learned disquisition on educational administration, but may I attempt to suggest a few ways in which the self-governing school might be recognized as the really responsible unit of education?

As a first step, we must get away from the conception that education is a partnership between an entity called the " State " and an entity called a " local education authority." The taxpayer and the ratepayer are the same person, and the question what part should be played respectively by the central exchequer and by the local rating authority in financing local services is purely a question of the incidence of different forms of taxation.

Education itself—at least up to the age of 18—is, broadly

speaking, a local function, and so far as it is financed out of public funds it should be financed out of local taxation. The central Exchequer must continue to make large grants out of central taxation in aid of local rates, but the amount of these grants should be determined, not by the amount of local expenditure on any particular service, but by a calculation of the proportion which, according to sound principles of taxation, taxes on the ownership and occupancy of land and buildings should bear to taxes on income and consumption.

But the statement that education is a local function means much more than that it should be conducted by the big local authorities of to-day. Within the big area of the county or the county borough public education is almost entirely carried on in day schools, and the younger the pupils the smaller is the area that a day school can serve. The primary school, especially, is an intimately local institution, serving the homes in its immediate vicinity and following closely every movement of population, as neither a local hospital nor a secondary school needs to do. It is surely strange that, in spite of this, the elementary school enjoys infinitely less self-government than the secondary school. It ought to enjoy quite as much; it should have a body of managers directly representing the district served by the school; and important responsibilities should be placed upon that body. There is a widespread demand to-day for equality of treatment for voluntary schools and council schools; why should we not secure that equality by putting on the council school managers the same responsibilities as now rest on voluntary school managers, and increasing the responsibilities of both?

In such a self-governing elementary school the county or county borough council might continue to pay the salaries of the teaching staff according to an establishment fixed from time to time. But the appointment of teachers would rest primarily with the managers, who would also receive from the Council a block grant for all other expenses of school management, to be expended at their discretion. There is, however, no reason why this grant should be regarded as covering all school expenses. The school district should be made to feel its local responsibility for improving the efficiency of its school by voluntary subscription and voluntary work. I wonder, for instance, how much money is spent on petty repairs in rural schools which in a Canadian township would be done in off-hours by a parent or even a school manager himself. I wonder, too, whether a great deal of the cost of school cleaning in rural schools, at any rate, could not be saved in the same way. The change in social habits which this would involve is precisely the change which we need as a nation in every social activity. The average *per capita* cost of elementary schools apart from teachers' salaries and loan charges, and disregarding also the growing cost of the administrative systems of local education authorities, has risen since 1923-24 from about 29s. 10d. to about 40s., and it is worth inquiring whether school managers, if they were left free to accumulate their funds from year to year and were made responsible for the condition of their school, could not discharge their duties efficiently with an average *per capita* grant from the local authority of between 25s. and 30s. Such a grant would, of course, be too small in some areas, notably London. I suggest it tentatively only as an average for the country as a whole. A system of this kind would obviously, moreover, reduce the administrative expenditure of local authorities. It would also be far more effective than the proposal more often made just now, that fees should be charged to parents. In the case of the elementary school, responsibility for the school should rest on every resident in the school district, whether he has a child at the school or not. That is the good old principle which works so well in countries like Canada. But I would not forbid a State-aided school to charge fees and I should repeal the clause in the Education Act which now forbids this in the case of elementary schools.

A similar question may be asked about the other main item of increasing expenditure in connection with elementary education—the medical services, the cost of which has risen in this period by about £1,500,000. Is it really necessary, in order to secure efficient medical inspection and treatment for all school children, to build up a great public service of school medical officers? If the medical profession is not sufficiently well organized or trained to do this work by local arrangement with the individual school, ought we not to aim at improving the great body of the profession instead of superseding it? Having ascertained by experience what is necessary to an efficient school medical service, has not the time arrived for a deliberate attempt to get the work carried out by co-operation between the local school and the local doctors?

A Sign of Social Disease.

Further, is there any real reason why the age at which compulsory education begins should not be raised and why the school should not be the judge whether and to what extent it is necessary to admit children below the age of 7? That is, by common consent, the age at which primary education, as distinct from the infant school, should begin, and it is, for that reason, the age at which, in principle, compulsion should begin. Our "infants' departments" are a most valuable form of education and I should regard it as a disaster if the State were to take active steps to exclude young children from State-aided schools, but that is no reason why the State should fill these departments by compulsion. Our low age of compulsory education is not a sign of social progress, but rather a sign of social disease.

But, above all, both the school district and the wider industrial or business area of which it forms a part should be made to realize its responsibility towards the "bright" boy or girl. Here we come from the elementary to the secondary school, and to a consideration of immediate interest to industry and commerce.

In education, as in everything else, those who demand a certain article must be prepared to pay for it. The business man who requires a supply of recruits for his business with a good secondary education must be prepared to pay for their education in so far as their parents cannot themselves afford it. In every city to-day it is quite easy to ascertain the demand for secondary school boys and girls in commerce and industry and the extent to which scholarships are necessary to supply this demand. Similarly with the trade union which requires a secondary education for its future organizers. But, here again, the proper agency for the granting of scholarships is the school, not any public authority. Every elementary and secondary school should have its own scholarship fund, provided mainly by voluntary endowment and subscription, and it should have full discretion in administering this fund.

The school is also the proper agency for the selection of its scholars at the beginning of their education and for estimating their capacities at the end. The State should neither conduct nor give official recognition to any examination in the schools. The history of the First Schools examination is a terrible warning of the tendency of any form of State examination, however desirable in itself, to become an artificial label and to create a demand for an artificial product manufactured at great expense to fit that label.

But if the responsibility for scholarships is thus to be transferred from public funds to school funds built up largely by voluntary gift or endowment, what should a scholarship mean? It must mean at least the remission of fees, and in many cases it will mean a small maintenance allowance. But what is the fee which should be remitted? At present the great majority of secondary schools supported out of public funds charge a fee ranging from just under 30 p.ct. to just over 50 p.ct. of the cost of education, excluding loan charges. On an average, the fees paid in schools which are maintained by the local education authority cover rather less than 25 p.ct. of the cost, while the fees paid in aided schools cover about 42 p.ct. (or rather less if we deduct fees paid by the local authority in respect of pupils holding scholarships), another 8 p.ct. being covered by endowments or subscriptions. Of the (in round figures) 440,000 pupils in all these schools, nearly 50 p.ct. pay no fees at all.

Now, broadly speaking, in a system of education based upon the principle of school self-government, I do not think that public funds ought to be called on to bear more than half the current cost of secondary education, even in the poorest schools. But if this is to be our aim we must revive the practice of private endowment of schools. The burden cannot simply be transferred to the shoulders of parents, with the assistance of a small and fluctuating school scholarship fund. The history of all the old foundation schools which have been forced in the last thirty years to take refuge under the shadow of the local education authority proves this. Education, as I have already pointed out in connection with the elementary school, has always been and must always be largely a co-operative effort, and in so far as co-operation is not to be achieved through the impersonal agency of the State, it must be achieved by a revival of private effort.

Need for New Schools.

Private gifts and endowments will, we may hope, increasingly come to the assistance of the existing secondary schools as more power and responsibility are thrown on their governing bodies, but perhaps where a revival of private co-operative effort is most urgently needed at the present moment is in the foundation of new schools. For the ever-growing pressure on public funds in the sphere of secondary education arises mainly from the fact that, except to some extent among the class who can afford to send their children to a "public" boarding school, there is literally no agency except the State which appears to be able in any circumstances to start a new secondary school of any kind. The cost of a first-class day secondary school education is, at the outside, let us say, £35; but the middle-

class parent who is quite able to pay such a sum but cannot pay much more has, in practice at the present moment, no choice but to try to get his child into an overcrowded secondary school maintained or assisted by the State, which will only charge him a fee between eight and fifteen guineas. Unless we can launch a movement to supply new self-supporting schools to meet this strictly "economic" demand by voluntary effort, it is little good talking about raising the fees of existing schools by a few pounds a year.

I refrain from dragging you further through the intricacies of education. The same ideas can be applied to technical and university education; they can be applied, too, to that transformation and diversification of education after the primary school stage which is so urgently required by our commerce and our industry. But I have spoken about education only as an illustration of a general proposition applicable to the whole range of our social services, and I have said enough to make my point clear. For certain purposes modern conditions require administration by increasingly large units. I believe the Local Government Act of 1929 was necessary and has conduced to economy and efficiency. In education, the relatively small education area, the urban district or the small borough, is generally, though not always, an ineffective compromise, too large for intimate management and too small for "rationalized" efficiency. In such areas efficiency is on the whole more costly than in the county or the county borough. But just because for certain purposes, both in education and in other social services, our administration is bound to become increasingly impersonal, it is the more necessary that for other purposes we should labour to recreate the really small local unit and should seek to make it the centre of a revival of voluntary co-operative effort. For if the people of this country need relief from taxation or continuous improvement in social services, they must be prepared to replace public by private expenditure, and substitute personal co-operative work for public administration. The disease from which we are suffering is that type of personal irresponsibility which seizes on the State as the most convenient agent. It is a disease which, in education, affects both the parent who leaves his child to go through the common compulsory mill, and the industrialist who passes the duty of training his employees over to the technical college at the cost of the rates. Irresponsibility of this kind may be the child of excessive legislation in the past, but it is bound to be the father of increasing State expenditure in the future.

I urge this the more strongly because I seem to see a terrible analogy between our state to-day and that of another country of which I have recently caught a glimpse. In India, there is much talk about expanding "nation-building" services, notably education, but every effort at educational expansion seems blocked by the fact that there is no spontaneous local demand for, or interest in, the village school. Public primary education in India has, for that reason, been obliged to start with the expedient of large percentage grants from central public funds in aid of local schools, and progress is constantly being arrested by the insufficiency of central funds, the low taxable capacity of the people. That is our state to-day, with this difference, that we have gone far to destroy an asset which India never had. Unless we can recapture that asset, there is only one prospect before us, the prospect of expensive stagnation.

One word in conclusion. The kind of voluntary co-operative effort of which I have spoken is only found in one type of society, a society with a good but simple standard of living. Here we touch the deepest reason for high taxation and expensive social services, the fact that our standard of living is far less simple than that of other countries. A high standard of living is not the true name for it, for in some essentials it is lower than that of other countries, lower for instance than Denmark, lower than Canada, lower even than Germany. Moreover, it is not a standard, for the most remarkable thing about it is its lack of standards, of any sense of the central importance of any one or two objects of expenditure. It is rather a swollen habit of living. The only corrective of such a habit is personal responsibility. At first an attempt to thrust back personal responsibility on to unwilling shoulders will result in discontent, in mistakes, perhaps in a period of bungling inefficiency. But these things are better than the only alternative, the alternative which now stares us in the face—social stagnation and the forfeiture of our title to be either a self-governing or a progressive nation.

Vote of Thanks.

Dr. Smith, in proposing a hearty vote of thanks to Lord Eustace Percy for his Presidential Address, remarked that they had rather feared at one time or another that their President's numerous duties in India would probably prevent him from being there or from preparing the address to which they had just listened. They were glad that this had not eventuated. They felt that for Lord Eustace Percy to have used this occasion to present an address of such a nature, of such statesmanship and sound analytical value on perhaps the most important subject in this country, was a great privilege and a compliment to their Society. They feared a year ago that they did not quite come up to the standard of the rest of the Industry or that their Industry did not come up to the standard of other industries in this country in regard to the calibre of their men. But for Lord Eustace Percy to put forward an address of this nature was confirmation of the fact that they were interested in technical education and that the calibre of their men was equal to that of any other industry in the country.

The subject of the address was too deep and important to be discussed on the spur of the moment, though some of the points raised had a direct analogy to their own Industry. They recognized the deficiencies in their Industry. They had a demonstration of the progressive attitude of the Industry in Watson House of the Gas Light and Coke Company, with its policy of taking men with a reasonable minimum of education and of giving them a course of some years in gas practice of one kind or another. Watson House was the Industry's technical organization for the preparation of young men in this great Industry. And this policy was common practice in the larger undertakings—to take young men, whether from contractors or from gas undertakings, and give them an education, not expecting to obtain any return for some years. They were putting personality into it, and they esteemed their responsibility in training these men. Another factor of great importance to the Gas Industry—and analogous to some points their President had made—was the danger of trustification. The great danger of this was the elimination of the personal touch. In recognizing this danger one must not go to the other extreme and advocate very small units. One of the criticisms made of the present development of electricity in this country was that they had adopted too large units in their super power-stations. It was questionable whether these super power-stations were justified in the size of their units or whether equally efficient current could not be produced in units of half the size. How did this affect their own Industry? When gas undertakings came together under one control they would be successful just in so far as they de-centralized. In large undertakings they must have the districts divided up, with a manager in each, and each district should compete with the others in service given to the consumer. And in so far as they de-centralized to that extent they would give service to the consumer, and gas would be sold in greater quantities.

"Buy British."

Another point—a topic of the moment, and one of the main objects of British industry—was the subject of "Buy British." This "Buy British" movement began at home. It was no use for the Gas Industry to ask other industries to buy British if they did not buy British themselves. They should encourage the Gas Industry itself to buy British; and all these subjects were opened up by the question of proper organization and proper conception. There was great usefulness in standardization, but it could go too far and be neutralized. They as contractors knew that of the 1500 odd gas undertakings in this country there were probably 1500 different ideas and requirements on the part of the engineers, whether in regard to gas meters, gas fires, or pipes. And every engineer who was worth his salt would at some time or another like something done differently. Every time there was a divergence from standardization, it must put up the cost of production and was thus a disservice to the Gas Industry. If an agreement could be reached in regard to the standardization of cast-iron pipes, for instance, then the cost of cast-iron pipes would be reduced. But if an engineer wanted a specification stamped on his pipes, all standardization was gone. This matter, said Dr. Smith, should be discussed, with a view to reducing costs of production and to deciding what was worth while and what was not. He had the greatest pleasure, he concluded, in thanking Lord Eustace Percy for his most valuable address.

Alderman F. J. West, in seconding the vote of thanks, said that he did so with particular pleasure, because two years ago he had approached Lord Eustace Percy with a view to persuading him to accept the Presidency of the Society.

Lord Eustace Percy, in acknowledging the vote of thanks, said that if he might make an excuse for the length of his address it was because they heard so much about economy to-day and were impressed by the fact that the advocacy of economy was so generalized that he wished to show them how to work the matter out in detail to some extent.

The meeting then adjourned for tea, when the new President, the Rt. Hon. L. S. Amery, M.P., was formally inducted.

Wales and Monmouthshire Association of Gas Engineers and Managers

Annual General Meeting at Swansea, May 26, 1932

The 27th Annual Meeting of the Wales and Monmouthshire Association was held on Thursday, May 26, at the Hotel Metropole, Swansea; Mr. ERNEST ABLETT, Secretary and Assistant Engineer of the Swansea Gaslight Company, and President of the Association, in the Chair.

At the outset, he introduced Mr. Ernest H. Leeder, Chairman, and Mr. Hugh Bellingham, a Director, of the Swansea Gaslight Company, who were present to extend a welcome to the Association.

Mr. LEEDER, who was warmly received, said it was seven years since he had the pleasure of welcoming the Association to Swansea. It was on the occasion of their opening of new gas-works at Morriston, and that year Mr. W. H. Johns, Engineer and Manager of their Company, was President of the Association. To-day they had again honoured one of the officials of the Swansea Gaslight Company, Mr. Ernest Ablett, and he felt sure the Board were satisfied that they could not have elected a better man. Mr. Leeder added that from his experience in connection with the profession to which he belonged, he realized the importance of such meetings as they were holding. They were able to hear professional papers and to discuss them, and this exchange of views enlightened them on questions affecting the great Gas Industry. Nowadays, they more than ever wanted to bring to their work new standards of culture. They were confident in the leadership of the Gas Industry. They were proud of their job, and had no cause to regret their connection with it.

The PRESIDENT thanked Mr. Leeder and Mr. Bellingham for their hearty welcome.

NEW MEMBERS.

Minutes of the last meeting were then read and confirmed; and the following Students and Associates were elected, on the proposition of Mr. H. SUTCLIFFE (Gowerton), seconded by Mr. D. MUIR (Pontypridd):

STUDENTS.—Ralph E. P. Hoskins and Horace E. Taylor, articled pupils under Mr. H. D. Madden (Cardiff).

ASSOCIATES.

W. H. Langford, Weston-super-Mare (Richmonds Gas Stove Company, Ltd.).
Frank W. Richmond, London (Richmonds Gas Stove Company, Ltd.).
F. Thomson, Croydon (Alder & Mackay, Ltd.).
Lt.-Col. O. B. F. Planck, Birmingham (Stewarts & Lloyds, Ltd.).
J. B. Smithson, Penarth (Stewarts & Lloyds, Ltd.).
W. A. R. Richardson, Cardiff (Stewarts & Lloyds, Ltd.).
S. C. Whitfield, Manchester (General Gas Appliances, Ltd.).
C. L. Bury, Hereford (General Gas Appliances, Ltd.).
J. Sadler, Newport (Parkinson Stove Company, Ltd.).
R. P. Gibb, Birmingham (Parkinson Stove Company, Ltd.).
J. H. Kemp, Knutsford (Fletcher, Russell, & Co., Ltd.).
F. Worthington, Warrington (Fletcher, Russell, & Co., Ltd.).
S. G. Glanfield, Cardiff (Willey & Co., Ltd.).
Reginald R. Bird, Cardiff (Bird & Son, Ltd.).
W. J. Roberts, Swansea (Burt, Boulton, & Haywood, Ltd.).
Harold Wharmby, Leeds (Wilsons & Mathiesons, Ltd.).
H. F. Ashley, Weston-super-Mare (Wilsons & Mathiesons, Ltd.).
E. S. Allen, Weston-super-Mare (Metropolitan Gas Meters, Ltd.).
Vernon Cowan, Cardiff (Welsbach Light Company, Ltd.).
C. G. Riseley, Cardiff (John Wright & Co.).
A. E. Adams, Exeter (George Wilson Gas Meters, Ltd.).
J. F. Thomas, Cardiff (Falk, Stadelmann, & Co., Ltd.).
A. H. Watson, Birmingham (Wellington Tube Works, Ltd.).
W. H. Tyce, Cardiff.
T. B. Walker, Bristol.
W. E. Gray, Bristol.
J. Parkinson, Bristol.

REPORT AND ACCOUNTS.

The statement of accounts showed receipts of £78 6s. 11d., expenditure £79 4s. 2d., leaving a balance of £10 9s. in the hands of the Treasurer, with £100 2½ p.ct. consols. One new member had been elected, two had died, five had resigned, leaving a membership of 71, 4 Hon. Members and 4 Students.

Report and statement of accounts were adopted, on the proposition of Mr. I. G. JENKINS (Abertillery), seconded by Mr. R. J. AUCKLAND (Cardiff).

NEW OFFICERS.

Proposing the election of Mr. I. G. Jenkins (Abertillery) as President of the Association, the CHAIRMAN remarked that Mr. Jenkins needed no introduction from him. He had graduated for the office through much hard work on the Council of the Association.

[*Photo. by H. A. Chapman, Swansea.*

THE PRESIDENT,

ERNEST ABLETT, of Swansea.

Mr. Ablett, who was educated at the Queen Elizabeth Grammar School, Wakefield, and Leeds University, was an articled pupil at the Rotherham Corporation Gas Department from 1904 till 1908, and from this year till 1914 was Assistant Engineer. In 1914 he was appointed Chemist and Works Assistant to the Swansea Gas Light Company, became Assistant Engineer in the following year, and Secretary and Assistant Engineer—the position he now holds—in 1919. At Swansea Mr. Ablett's experience has been both wide and varied.

Mr. W. COLLIN (Bridgend) seconded, and Mr. Jenkins was elected unanimously.

Mr. T. Wilkinson (Abercarn) was elected Vice-President on the motion of Mr. D. W. DAVIES (Tredegar), seconded by Mr. J. A. BOUCHER (Maesteg). Messrs. E. H. Clarry (Cardiff) and B. Taylor (Treharris) were elected to the Council. The Treasurer, Mr. J. H. Canning, O.B.E. (Newport), and the Secretary, Mr. Octavius Thomas, were re-elected. Messrs. L. W. Nuttall (Pembroke Dock) and D. Muir (Pontypridd) were appointed Auditors.

BENEVOLENT FUND.

The SECRETARY stated that between £5 and £6 for the Benevolent Fund was returned by prize-winners at the

golf meeting held the previous day. Ten guineas were voted by the Association to the Benevolent Fund.

PRESIDENTIAL ADDRESS

of Mr. Ernest Ablett, Secretary and Assistant Engineer to the Swansea Gas Light Company.

Some years ago a certain corporation official informed me that he was able to identify the various cycles of industrial prosperity and depression by a study of his records of the number of pauper burials, and although I would never have sought for a trade barometer in that direction, I scarcely evinced that amount of surprise and unbelief that my informant had expected. The reason of this ready appreciation of his statement was, of course, because we in the Gas Industry have had for many years, by virtue of our extensive and intimate contact with the public, ample opportunities for gauging the varying extent to which the public make use of our commodities, the variations of demand in industrial and residential areas, and the varying readiness which customers have shown towards the discharge of their liabilities.

Unfortunately, the general experience of late years has rendered the consultation of any trade barometer totally unnecessary; the position has been only too apparent, and consequently we must be regarding with relief and hope all those indications which now seem to give promise of the lifting of those clouds of depression and of a return to solid activities in industry and trade.

It is recognized that there have been already from time to time occasions when a return to brighter conditions looked probable, that there have been temporary improvements of short duration, that there have been promises of improvement which never materialized at all. At the same time, I do not think that we have had previously such a combination of promising features, and therefore it is perhaps all the more appropriate that consideration be given to any means which may, by cheapening costs, by extending sales, by increasing the satisfaction of our consumers, obtain for us a fair share of the benefits accruing from any trade revival which eventually may materialize.

Poverty in Time of Plenty.

While there have been during the past years various and varied opinions as to the cause or causes of the depression, there has been, also, almost universal agreement that we have been suffering from a poverty in a time of plenty and not from a poverty due to scarcity. We have constantly heard, and are still hearing, of instances of vast excesses of this or that commodity or product, in this or that part of the world. Production has greatly overtaken consumption, and artificial measures, such as the burning of coffee beans, the throwing back into the sea of whole quantities of fish, restricted output of either labour or machines, the operation of this or that " quota " system, have been adopted in an endeavour to restore equilibrium to that delicate balance, supply and demand.

We have seen strenuous efforts made by various industrial enterprises to diagnose and remove the cause of their difficulties, and we have noticed that there have been fashions in the methods adopted. The evergreen method of setting up a commission, the appointment of committees of inquiry, rationalization, amalgamation, financial reconstruction, the calling in of expert after expert, the adoption of this or that slogan, have all been tried, and much good work has been achieved and much useful progress made. It appears, however, that the bulk of the resultant improvements has been directed towards reducing production costs, by increasing the output per unit of either labour or machines, and consequently only moderate ultimate success has resulted.

In the Gas Industry the co-ordinated study of the science of production is not of post-war birth, for it can be justifiably claimed that there has been devoted to it for many years past—and along well ordered lines—enthusiasm, energy, and research. From even before the time when Newbigging formulated his slogan " Profits are made in the retort house," there had been intense concentration on ways and means to bring about efficient and economical carbonization. It is possible that the spirit of personal pride or of personal jealousy proved a staunch ally to the desire for scientific and economical results, for most of us can well remember, prior to the advent of the therm, the sometimes injudicious strivings for a " make per ton " which would, if not gain pride of place for the district, at least prove one better than that of the man next door. Perhaps greater attention has been paid to questions of carbonization than to any other branch of the Industry, but at any rate it can be said, with certain qualifications, that there are to-day certain accepted standards, both as to plant and results, over which little immediate improvement may be expected, and consequently, where those standards are being obtained, it is necessary to look in other directions if the Industry as a whole, or an undertaking as a unit, is to capture its share of trade revival.

It is admitted that no product, however cheap, sells itself by virtue solely of its low price, and it is as a result of the recognition of this fact that so much attention of late has been given to Service and Salesmanship.

Salesmanship and Imagination.

It is not my intention to permit myself a dissertation on the features essential to successful salesmanship; I do not concern myself whether it is an art or a science; I do not subscribe to the opinion that a salesman is born and not made, recognizing that training along duly co-ordinated and proven lines is indispensable, but I do believe it is a field which many will cultivate, and cultivate successfully, in their own way and in their own time, after having previously given serious consideration to the work in hand, the goal to be attained, and after having brought to their aid enthusiasm, energy, and enterprise, and, last but not least, that precious quality imagination.

This belief in the success which may attend the efforts of him who studiously endeavours to work out his own salvation is in no way antagonistic to a deep appreciation of the value of " team " work, for it is based on the assumption that the fullest advantage be taken at all times of all the knowledge, service, and assistance which are available, and which—so far as the Gas Industry is concerned—are available in such generous measure. While organizations for the direction, control, and co-ordination of effort are essential, the value and absolute necessity of individual effort are incontestable. Indeed, it is contended by many that individual effort must be one of the chief levers to bring back those brighter prospects we hope for, and in the Gas Industry, which has pioneered and fostered the principles of Co-Partnership, the virility and activity of the individual for the good of the team should surely be most readily appreciated, most definitely apparent.

It appears, therefore, that for any gas undertaking seeking to effect economies in production or distribution, or seeking to improve its position by developing a policy of salesmanship, there are already available well-established and soundly-proved principles and policies of an excellent standard.

On the other hand, it cannot be so strongly asserted that there are as freely available standards of like excellence or like variety for those seeking to effect economies in that expenditure which may be called not directly productive—namely, expenditure in respect of work of a clerical or supervisory character—although it represents towards the total expenditure a proportion which can by no means be ignored.

Accordingly, when it was suggested to me by more than one of my confrères that you would be interested to hear how the Swansea Gas Light Company has sought, by the introduction of modern office machinery and systems, to effect economies in this non-productive expenditure, I decided to adopt their suggestion in the hope that our experiences may prove, in some direction or other, of service to you. In indicating the systems adopted and the office machinery introduced, I would strongly emphasize that no particular originality or excellence of standard are either claimed or suggested.

A Note of Warning.

In the first instance I would like to issue a note of warning to those who may be disposed to regard the introduction of modern office machinery or systems as something more or less an extravagant luxury, or as something adopted as a pet hobby horse of this or that official, or at best as something which may or may not be of economic value or of useful assistance in the case of large undertakings only. Such a preconceived outlook is prejudicial to progress, prejudicial to salesmanship or service, and prejudicial to selling costs, because office charges are charges which the consumer has to pay, and they are charges which —in view of the growing demand for records, statistics, analyses, and all kinds of data—are likely to increase rather than diminish.

Excluding typewriting, copying, and duplicating equipment, our first essay of office machinery was the purchase of a calculating machine. It proved a successful venture, for it rendered possible things which had previously been impossible. Extremely little mechanical trouble was experienced throughout its life of ten years, and its successor is fully engaged every minute of the week either adding or calculating work in connection with wages, fittings, rentals, necessary to draw up a form of time-table for the operator's guidance, in order to prevent the machine being sometimes idle and at other times in demand at several points.

Just over ten years ago we installed an addressing machine, and again our experience has been most fortunate. This machine is, of course, not in use as constantly as the calculating machine, but it has done yeoman service, and without it the same amount of work could not be achieved

with the same personnel. Wages sheets, pay envelopes, and clock time cards are written up by the machine weekly; gas accounts are addressed quarterly; shareholders' registers, dividend lists and warrants, and shareholders' address books are done half-yearly; co-partnership scheme, superannuation scheme, and staff register work are done yearly, while intermittently and unexpectedly there arise jobs which are handled by the machine with despatch and efficiency. There are very few gas undertakings where the installation of an addressing machine will fail to result in a reduction of non-productive expenditure.

Sorting by Knitting Needle.

The next attempt to speed up results without increasing personnel resulted in the introduction of a system whereby papers or cards bearing matter for analysis could be rapidly extracted or sorted. In this case, the only "machinery" required by the system of sorting adopted, called the Paramount Sorting System, is a knitting needle. The cards required to be sorted are purchased with a series of holes punched out of one or more of their sides, each hole having been coded to represent a number or an item. As early as possible the card is made indentifiable by destroying the appropriate hole with a pair of clippers similar to those used by a tram inspector, and consequently, when later it is required to find that particular card or all cards of that particular coding, it is only necessary to slip a knitting needle at the desired point through the batch of cards to be sorted, lift the pack and the cards whose holes have been destroyed will separate out.

The system was primarily adopted for fitters' job dockets (average daily number 150), as these dockets demand much sorting for costing and analysis purposes, particularly as we operate a rather comprehensive census of apparatus used by, and service rendered to, consumers. Prompt benefits from the system were experienced, of which the ability to extract, price up, and invoice chargeable jobs before dealing with dockets relating to departmental work was not the least. The system has been extended successfully to fitters' time sheets, shareholders' forms of proxy, &c., and further extensions are contemplated.

Machine Billing.

Encouraged by the experience of these installations, it was decided in 1930 to introduce the necessary office machinery to effect the machine billing of gas accounts, and also, as adjuncts to such machinery, a postal franking machine and a machine for receipting accounts.

The principle of postal franking machines is doubtless well known to most of you, and it need only be said that its simplicity of manipulation renders possible the despatch of large mails with speed and ease. Prior to its introduction, each department dealt with its own mail, but now the whole of the Company's mail is despatched from one centre and the various departmental postage books have been done away with. A range of dies for use with the machine has been prepared, so that it is possible to make envelopes serve as media for carrying advertisements appropriate to the season of the year.

The machine receipting of accounts is effected by a machine which has been adopted by certain municipalities for the rapid receipting of rates, and it demands that the account to be receipted be provided with a detachable extension piece or stub, and that the name and address of the consumer, together with the amount due, appear on both the account and the stub. The machine, which has a base of about 12½ in. by 6 in. and is consequently a convenient counter fitment, has a handle to which is attached a die box containing a metal die bearing appropriate receipt wording, an identification number, the appropriate date, and enclosing an enumerator which prints on the stub of each account receipted the serial number of the receipt given. Independent of the invisible enumerator in the die box is a visible enumerator which enables a record to be taken at any time of the number of receipts given since the last index was taken.

Adequate safeguards are provided to prevent any receipt being given without being recorded on the enumerator, and inasmuch as the operation of the machine is that of lightly swinging over the handle, rapid receipting is easily obtained. Benefit from these machines has been the more pronounced in the showrooms, as the time gained in receipting has been expended in salesmanship. After receipting, the stub is detached from the account, handed subsequently to the cashier with cash equivalent, and then used as the medium for credit posting.

Before describing the system adopted for the machine billing of the quarterly gas accounts, it is perhaps advisable to describe the system in operation prior to the change.

Briefly, the indices of consumers' meters were recorded in bound books, the reading of the meters extended over a period of about five weeks, commencing the first week of the third month; the area of supply was divided into three districts, each district being covered by its own "rental;" three rental clerks posted into the rentals the gas consumption, the various rental debits, and also any amounts in respect of "fittings" which were unpaid at the end of the quarter; the gas accounts, duly addressed by the addressograph machine, were written up as regards gas consumption and charges from the bound meter books by the meter inspectors and completed by the rental clerks from their rentals as soon as the rentals were balanced for the quarter; dispatch of the gas accounts commenced generally towards the end of the third week of the fourth month, and lasted about two and a half weeks.

Principle Adopted.

As soon as it had been decided to install a billing machine, increased consideration was given to the practical details of the system to be adopted and to the method of changing over from the old to the new system. It became immediately evident that, inasmuch as the machine operator must be regarded very much as a "copyist," the throughput of the machine would be largely dependent on the arrangements made for the submission to the operator of the matter to be reproduced. Clarity and accessibility of original data therefore became paramount essentials, and the principle of making it possible for the operator to pick up all his matter from one source, and in the same order in which it had to be reproduced, was adopted.

Accordingly, with this end in view, certain alterations were made while the old system was in operation. First the meter readers' bound books were replaced by cards designed to meet the above requirements. These cards are printed on both sides, and, to facilitate the turn-over when one side is completed, are printed "tumble headed;" the consumers' name, address, and appropriate ledger folio are printed on the card by means of the addressograph machine. Division of the area was extended from three to four districts, each district being sub-divided into sections of 2000 folios, each district also having for its relative meter cards, ledger accounts, and gas accounts, a distinctive colour.

Arrangements were next made to confine accounts in respect of chargeable fitting work to a separate "Fittings Ledger." A compact monthly record of paid and unpaid fittings accounts became immediately available, and the change also surmounted a difficulty which would have arisen in sorting out into relevant districts unpaid fittings accounts for reproduction by the machine on the gas accounts.

These alterations were introduced without any dislocation of the work of any of the staff, and proved beneficial even to the old system.

It is recognized that detailed descriptions of systems of rental accountancy embodying the billing of accounts by machines have appeared in the Technical Press, and consequently the intention of the following remarks is not so much to describe or survey the principles or details of machine billing systems as to describe the system for machine billing gas accounts as adopted by the Swansea Gas Light Company, and to deal in a practical way with the procedure adopted and the results obtained.

Machine Billing at Swansea.

Generally speaking, the practice in connection with hand-written rentals is that the gas accounts are not dispatched until the last debit has been entered in these rentals and the rentals balanced. This same procedure can be maintained with certain machine billing systems, but in our case it was decided to adopt a system whereby the gas accounts could be dispatched as soon as completed.

This necessitated the provision of a separate ledger account for every consumer, and the installation of a machine (specially designed for the work of public utility undertakings) which at the same operation prints the gas account, produces a duplicated record of the data printed on the gas accounts, and also reproduces on the consumers' ledger accounts the amounts of their individual total debits.

It must be pointed out that the machine provides an automatic check against inaccurate subtractions of the meter indices recorded, and also not only automatically totals the various debits of each individual account, but also automatically totals and holds within itself, in accordance with pre-arranged classification, all the printed debits —that is to say, it accumulates totals of debits in respect of (say) gas, meter rents, permanent hire rentals, arrears, &c.

When a sheet of duplicated records of the debits of its relative gas accounts is completed, these vertical totals accumulated in the machine are printed at the foot of the sheet, and it will be readily understood that if the data on this sheet, after having been analysed and checked, are balanced and found correct, the relative gas accounts must also be correct and therefore can be immediately dispatched.

These sheets of duplicated records, duly numbered, are filed in a loose-leaf binder, and a summary is made of their various totals. From this summary are obtained the final totals of the various classification of debits, or, in other

words, the usual quarterly data as to gas sales, gas charges, arrears, permanent hire charges, &c.

New Scale of Charges.

Before proceeding further, it may be said that, coincident with the introduction of the billing machine, the Swansea Gas Light Company decided to put into operation a scale of prices for gas under which the price per therm varied in accordance with the quarterly amount of gas consumed. Ten different prices per therm are in operation, and by an analysis of the duplicated records on the sheets already referred to, and by the transference of such data to the final summary, the total amount of gas consumed quarterly under each particular group is easily obtained.

You will doubtless be interested to see our gas accounts as prepared by the machine, and specimens are available for your inspection. Each account, it will be noticed, informs the consumer of the gas consumption in therms, the rate of charge, the amount of meter rent, the amount of hire of any apparatus, the amount of arrears, and the total amount due, which amount is also repeated on the perforated stub of the account which is necessary for use in connection with the receipting machine already mentioned.

There are also available for your inspection specimens of the consumers' ledger accounts. You will observe that each account is designed to give a record of the consumer's account over six years, and you will at once appreciate the saving effected in only being called upon to write up once—and that by the addressograph machine—instead of six times, the consumer's name, address, &c. Doubtless, too, these consumers' ledger accounts, with their type-written figures lying cleanly in the respective quarterly spacings, and with conspicuous blanks in cases where no quarterly payment has been made, will appeal to you not only because of their clarity, but also because of the length of record provided when it is necessary to review a consumer's account.

Having referred to payments, it will be opportune to mention that credits as well as debits are posted on the ledger accounts by machine. The original data for such cash posting is obtained from the stubs detached from the receipted accounts. When the new system was first inaugurated the billing machine was used for entering both debits and credits, but subsequently, on account of reasons which will be explained later, a second and cheaper type of machine was purchased, and to-day the debits are posted by the billing machine, while the credits are posted by the second machine. Totals of the credit amounts posted are accumulated in the machine and these totals when printed on a suitable " slip " are checked with the amount of cash received by the cashier.

When the billing machine was installed two of the staff were instructed as to its manipulation, and after a reasonable amount of practice good results were produced. To provide further practice for these operators and to ensure that all data entered into the new system were correct, both systems were operated concurrently for one quarter. This naturally occasioned increased work, but our opinion is that this manner of marrying the two systems was well worth the trouble involved. Cash posting on the billing machine naturally reduced the availability of the machine for billing, and because of this factor and also because there was a need of an analysis machine for other work, such a machine was installed and, *inter alia*, used for cash posting. To create a contrast on the consumers' ledger accounts between debits and credits, the cash posting machine was fitted with an all-red ribbon.

To-day, therefore, with an operator and a relief operator, the billing machine is in constant use from 9 a.m. to 5 p.m. We are billing about 12,800 accounts per quarter, and even after taking into consideration the tedious delays occasioned at the end of the billing period by attention to meters which were inaccessible when the inspector made his first visit, the average daily number of accounts billed over the whole period is about 525 accounts. If it were desired, the Swansea Gas Company could with its existing personnel and equipment, though with little margin for illness, breakdown, or holidays, adopt a system of monthly billing, particularly so as in this case a meticulous " clean-up " of unread meters would not be so essential.

As previously stated the gas accounts are dispatched as soon as their respective control sheets are checked and balanced, and, with the object of giving a consumer an early opportunity of checking his account with his meter index, the daily number of meters read is regulated so as to provide merely a reasonable margin in excess of the accounts billed. By this arrangement a consumer receives his account about two to three days after the index of his meter has been taken. Great importance is attached to this feature of the new system, because a consumer's complaint as to excessive consumption can, by means of a prompt second reading and/or test, be disposed of with greater satisfaction to both parties.

This arrangement, together with the fact that there is removed the old-time feverishness to get the rentals written up and balanced, permits a longer period for the reading of meter indices, with the result that the necessity under the old system of bringing in outside help in the way of fitters or fitters' apprentices has been removed.

The following brief description of the practical working of the system will also serve to enumerate the office staff engaged on the rental work connected with accounts machine billed quarterly.

Alterations and additions to the " plates " of the addressograph machine are effected daily by a junior, and, as each new plate is made, the consumer's name, address, and appropriate rental folio number are promptly printed on his meter card and on his ledger account.

Keeping Information Up-to-date.

In due course, this same junior prints the consumers' names and addresses on the blank gas accounts, and on the stubs thereof. Incidentally he keeps up to date the " plates " in respect of employees for use in connection with wages sheets, pay envelopes, time cards, &c., and also " plates " in respect of registers of the Company's stockholders. He also sorts and files away, in serial order, the " fittings " dockets previously referred to as being designed for the Paramount sorting system.

The meter cards are arranged over-night and handed to the inspectors by a clerk who keeps a record of the cards handed out and returned.

When returned, the meter cards are scrutinized and priced up by a rental clerk who has previously, as and when the occasion arose, written up on the cards any changes in hire charges, &c.

Meantime a supervising rental clerk has " closed " the rental of the particular section being dealt with, and has written the outstanding arrears on the consumers' ledger accounts, through a carbon strip called a duplicate posting slip. The use of this duplicate posting slip is invaluable, because without it, in case of the machine-printed arrears total disagreeing with the cash book, it would be impossible to tell whether the error arose through a wrong subtraction or through a wrong copying by the machine operator.

The machine operator now has the blank accounts duly addressed, the ledger accounts with arrears, if any, duly shown, and the meter cards written up as to gas consumption and charges and also hire charges. All are in the same sequence order, but naturally unread meters create gaps in the sequence of the meter cards. He proceeds to print the gas accounts, producing as previously stated a duplicate record on a sheet of the data printed, and also a repeat printing of each total debit on the stub of the account and on the ledger account.

As soon as the operator has printed a sufficient number of bills to fill a sheet with duplicated data, the sheet, together with the relative meter cards and gas bills, is handed to the relief operator, who checks the totals of gas consumption and hire charges appearing on the sheet, by passing the various amounts from the meter cards through the analysis machine, which is capable of producing simultaneously totals in five different columns. This operation is a safeguard against omissions or inaccuracies by the billing machine operator.

From the analysis machine, the sheet, &c., is passed to the calculating machine, whose operator checks the gas charges at the various rates and completes the analysis at the foot of the sheet. The attention of the supervising clerk is drawn to any errors which may be found on the sheet, and after he has made the necessary alterations on all the documents concerned, the gas accounts are passed on to the mail department for immediate dispatch. Completed sheets are filed by the supervising clerk, who summarizes the sheet totals and produces the final quarterly returns.

Team Work.

The foregoing description has had to be drawn somewhat sketchily, but it is hoped that it will have enabled you to understand the methods we have adopted and the staff directly employed on this rental work. Here I would like to emphasize one big difference between the practical operation of hand-written rentals and of machine billed rentals. In the former system, where a rental clerk is responsible for his own rental, he is a unit unto himself, and within limits his work has no effect on that of his colleagues. In the new system each worker, at every stage, is one of a team, and a delay here, or a dislocation there, has an immediate effect on all the phases of the cycle. A machine billing system, like all repetition work, demands from start to finish perfect rhythm, and this can only be obtained by detailed organization and by loyal staff co-operation. As to the latter, we are at Swansea very fortunate, and as regards the former it may be said that a careful and constant study of the practical working of our original procedure enabled us to introduce here and there this or that

alteration, which, although small in individual detail, served to remove friction and increase output.

We have now attained a standard which we believe can be regarded as satisfactory; and surveying the present system as a whole, we claim over the old system the following typical quarter's payments:

(1) Additional assistance for meter reading not required.
(2) Overtime by rental staff entirely obviated.
(3) Reduced salary list of rental staff.
(4) Earlier dispatch by five weeks of first batch of gas bills.
(5) Last batch of gas bills dispatched about ten days earlier than first batch of gas bills under old system.
(6) Earlier completion by about two days of various final quarterly data.
(7) Earlier flow of gas rental receipts resulting in reduced charges on overdraft.
(8) More even flow of gas rental receipts and quicker receipting resulting in increased opportunities for salesmanship at showrooms.
(9) Greater and improved facilities for concentration on unsatisfactory accounts, resulting in reduced arrears and reduced bad debts.

(*Note.*—The arrears at the end of the December Quarter, 1931, were lower in amount, and lower in percentage of amount to be collected, than those in respect of any quarter in any year as far back as 1912, despite increased number of accounts, increased amount to be collected, and acute trade depression.)

It is submitted that similar advantages from machine billing, &c., would accrue in the cases of most gas undertakings, although naturally their magnitude would vary in accordance with the particular conditions appertaining at the time of change of system.

Savings Effected.

It is often difficult and sometimes impossible to assess the monetary value of a particular benefit, and at Swansea, inasmuch as the change of system was effected at a time when re-organization was conveniently possible owing to a staff retirement, but also at a time when increased work was created by virtue of the new scale of prices of gas, it has not been possible to obtain definitely the saving effected.

It can be stated, however, that the salary list, irrespective of fluctuations of war bonus but inclusive of overtime and additional assistance, shows a reduction over the whole of the Rental Department (ordinary and coin) of £804 per annum, and of this amount it is estimated that no less than £450 can be directly regarded as a saving effected by the new system. The yearly saving in charges on Bank overdraft is estimated at £114, so that a total yearly gross saving of £564 has resulted.

Ignoring the cost of the calculating machine and the addressograph machine and equipment, both of which were necessary either for the old system or for other work, the initial expenditure on machines was as follows:

	£
Billing machine	550
Analysis machine (second-hand)	150
Three receipting machines	75
	£775

The expenditure on new stationery equipment is not expected to exceed, over a period of years, that of the old system; the life of the machines may be reckoned as ten years; their yearly unkeep under a maintenance scheme is negligible, and accordingly it will be evident that a net yearly saving of about £440 has been attained at Swansea by virtue of machine billing.

Further, it must be pointed out that it is our intention to use the billing machine in the near future for the purpose of preparing dividend warrants and dividend lists.

Concluding with a few general observations, I may say that, after two years' experience with the machine billing equipment and after 10 years' experience with the various other office equipment, our Staff would not like to be working again under the old conditions. As previously stated we have found for each equipment installed a sphere of usefulness in excess of the basis estimated on installation. Most undertakings find that clerical work increases either as a result of increased gas sales, or as a result of the increased analytical data demanded by either voluntary or involuntary requirements, and it is safe to say that the only true method of reviewing the working costs of any new system is to compare those costs not with those of the old system, but with the costs as they would be if the new volume of work was being produced by the old system.

Having said that with the present equipment and the present number of consumers we could carry out a system of monthly billing, I ought to say that it is not our intention at the present to put such a system into operation. I am not unappreciative of its advantages, but consideration must be given to local characteristics and conditions. However, I confess that monthly billing is the only system of continuous billing that now has any real appeal to me, partly, perhaps, because of the fact that at Swansea the same rate of remuneration is paid for the collection of money from coin meters as for the reading of ordinary meter indices. This arrangement permits a successful marrying of the work, resulting in the reduction of wasteful walking time by reason of the elimination of the overlapping which ensues when the work is done by two separate departments.

No discounts for prompt payment are offered at Swansea, but the prompt response by the public and the even flow of money received is shown by the following table of a typical quarter's payments:

—	Week of Quarter.	Weekly Receipts. £ s. d.
Supplementary		254 13 4
Gradual opening (and dispatch of bills) of quarter	1st	276 9 6
	2nd	1,746 10 9
	3rd	1,003 17 0
	4th	1,969 2 2
	5th	1,800 10 9
	6th	1,763 3 8
	7th	1,914 9 3
	8th	1,526 0 3
	9th	1,879 7 11
	10th	1,079 6 8
	11th	1,966 7 8
	12th	1,441 7 11
	13th	1,254 4 6
Gradual closing with simultaneous opening (and dispatch of bills) of new quarter	14th	453 17 10
	15th	331 15 7
	16th	64 6 2
	17th	32 4 5
Allowances and bad debts		216 11 9
Arrears		2,872 10 9
Total debit		£23,838 7 9

Where discounts are offered it is generally found that payments are negligible until the closing discount date.

During these past few years much research and effort have been expended in the Gas Industry in regard to the best method of charging for gas; there is already practically universal unanimity that, if increased outputs are to be obtained—indeed, if existing outputs are to be maintained—a flexible and attractive price list must be available to the public.

Whatever method of charge is finally recommended or permitted, it is obvious that the old flat rate system of charge must go and that a price list of wide range must take its place, if there is to be any measurable success for industrial gas and any adequate safeguard against the unprofitable consumer. This price list will not only entail increased work in the preparation of gas bills, but, if it is to be constructed and maintained on sound lines, there will be required not only detailed analyses of production costs, but also detailed analyses of gas consumptions and receipts in the various classifications adopted; and I suggest that if in the future there is to be no increase in that expenditure which is not directly productive, there must be in gas undertakings a greatly extended use of modern office machinery.

Mr. H. D. Madden (Cardiff) proposed a vote of thanks to the President. He observed that during Mr. Ablett's year of office the Association had made a great change, having widened its scope by admitting representatives of engineering firms as Associates, thus enlisting valuable experience. As an Association they had dealt largely with the technicalities of carbonization, purification, &c.; and they could now have papers dealing with outside matters, such as works administration. He was glad of this, because these were matters very important in the running of their industry. Turning to the subject of the Address, Mr. Madden remarked that the day was past when they could wait in their offices for consumers to come cap in hand for a supply of gas; and a billing system such as the President described was undoubtedly a great step in the work of service and salesmanship. He would like to hear his colleague, Mr. Auckland, because both of them had seen these billing machines at work. In Cardiff, also, they had some experience of these methods. The President's Address was one to take away and read, not once but many times. The introduction of new methods would be an advantage even in small and medium-sized works.

Mr. W. H. Johns (Swansea) seconded the vote. The Address was of a very high order, and acceptable in that the material was so original. Machine billing was widespread

in the States, but not so much here; they in Swansea had found the system of great benefit both to their undertaking and to the consumers. For one thing it meant an earlier receipt of the money due; then, from the service point of view, it meant that the consumer had his account earlier, could look into it, and if necessary make a complaint. And it was easier for the Company's officers to give consideration to the matter without the long interval often entailed under the old system. They must remember that the results could not be represented in total merely by the monetary showing. There were other benefits such as the smooth running of the office. He took the opportunity of warmly congratulating his colleague.

Mr. R. J. AUCKLAND (Cardiff), speaking of the change in the constitution of the Association, said that the introduction of outside papers would be a very valuable development. By admitting a new class of member they had increased their scope and taken a great step forward. As for the Address, when salesmanship was looming so large it was necessary to look to all means of improving organization. He would like to congratulate Mr. Ablett, not only on his year's work, but also on his courage in tackling the problem of billing. Thereby he had made a radical change in the Swansea Company. The results were before them, and spoke for themselves. Regarding their experiences in Cardiff, he could not say much, as they had not introduced these machines, but he would mention that as many as 27,000 slot meters in Cardiff were dealt with by amazingly few clerks. The records were always good, and their Auditors highly satisfied. He noted that a certain amount of supervising was still necessary with the method of machine billing adopted at Swansea; and if the staff engaged thus could be liberated they would be free for salesmanship work in other departments. In reference to the system of continuous quarterly meter reading adopted by Mr. Sandeman at Croydon, Mr. Auckland said that here surely was the way to the best use of automatic billing. The principle was much in vogue in America, and had been mentioned in the Report of the Gas Charges Committee. He considered that this system was a matter for the individual consideration of undertakings; but all were indebted for the help which the President's explanation afforded.

Mr. I. G. JENKINS (Abertillery) asked how the Swansea office dealt with a consumer who failed to bring his account to the Showroom. Secondly, if the cashier inadvertently returned the stub to the consumer, what check had the Company? Thirdly, had the President considered the question of extending the system to slot meter consumers?

Mr. W. CLARK JACKSON (Neath) thought the subject of the Address was a matter with which many engineers were not competent to deal; nevertheless it was a most fascinating study, and the information given would be highly useful. In the smaller undertakings there was always the difficulty of apportioning jobs to the staff. They had to have a minimum number of staff; and sometimes it was difficult to find work for them, sometimes overtime was necessary. Could machines effect a saving in this direction?

The vote of thanks having been carried with acclamation,

The PRESIDENT thanked the members for their close reading of his paper. In reply to Mr. Jenkins he said that if a consumer arrived at the showrooms to pay his account without the receipt form, they had to telephone his name and address to the Rental Office for the particulars; then a duplicate was made out on the machine. If the payment was to be on account, then a hand-written receipt was given. It had only once occurred that a stub was returned, and in that case the consumer concerned sent it back to them. Extension of the system to slot meters had not yet been considered. Mr. Madden had referred to the extension of the membership of the Association. He, Mr. Ablett, agreed that this would provide a wider sphere of choice of papers; but it made the choice of particular subject-matter for a paper more difficult. He agreed with Mr. Madden that billing was essentially a factor of salesmanship. Each undertaking had to decide on the merits of monthly, quarterly, or continuous billing, but he thought that very few engineers of undertakings in the Association would not benefit by adopting machines to varying extents. In pressing his Board for the installation of the machinery, he had been careful never to stress the monetary advantages. Incidentally the Swansea Corporation Electricity Department were working continuous meter reading but quarterly billing. But he did not like this, one of the main disadvantages being that a particular quarter's account did not refer to the specific quarter's consumption.

Mr. J. H. CANNING, O.B.E. (Newport), proposed a vote of thanks to the Chairman and Directors of the Swansea Company for providing a room for the meeting, and for their hospitality. This was seconded by Mr. W. GIBBON (Haverfordwest), and carried unanimously.

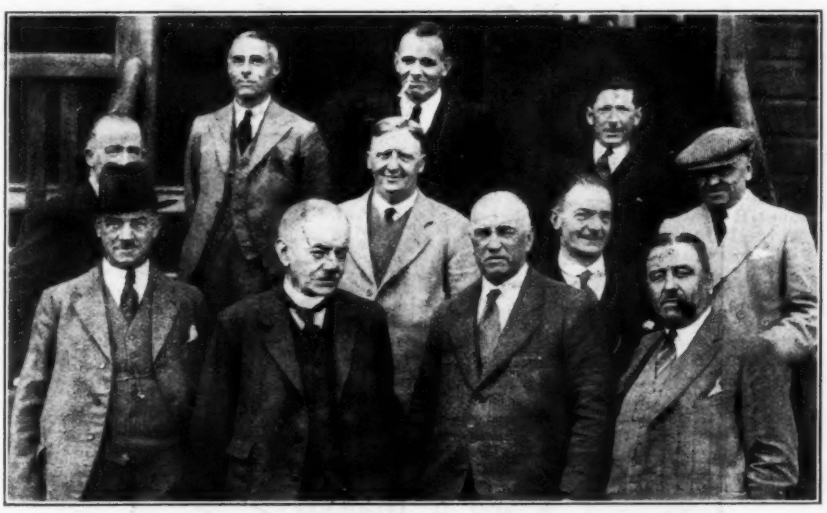
The decision as to the place of the next meeting was left to the Council.

LUNCHEON.

Subsequently, members were entertained to luncheon at the Hotel Metropole by the Chairman and Directors of the Swansea Gaslight Company. Mr. Ernest H. Leeder (Chairman) presided, and the guest of honour was the Mayor of Swansea (Alderman J. Barclay Owen). Occasion was taken to present to Mr. T. B. Walker (Bristol) the Upjohn Cup won at the golf meeting the previous day, and to Mr. Ernest Ablett the Walter Meacock Cup won at the Rotarian Golf Tournament at Llandrindod recently.

Submitting "The Town and Trade of Swansea," Mr. J. H. Canning, O.B.E. (Newport), said the position of trade in Swansea led some of them to hope for a revival in their own towns. Swansea, from the trade point of view, was one of the brightest spots in South Wales.

The MAYOR, responding, expressed pleasure at the elevation of Mr. Ablett to the Presidency of the Association. Mr. Ablett, he said, was the soul of courtesy and urbanity, and his personal charm was widely known. There need be



[By courtesy of the "Swansea Evening Post."

AT THE CLYNE GOLF CLUB, SWANSEA,
where the Wales and Monmouthshire Association met for the Upjohn Cup last Wednesday.

Front Row: H. Sutcliffe, Octavius Thomas, J. B. Smithson, J. Prosser Jones.
Second Row: H. H. Langford, J. Sadler, F. Worthington, G. C. Riseley.
Back Row: Mr. Birkinshaw (of the Clyne Club), Vernon Cowan, A. W. Adams.

no apprehension at his (the Mayor's) presence at that function, because the Municipal Electricity Undertaking and the Gas Company, as the lion and the lamb, could even lie down together. It would be a long time before they could do without gas in this country, and one day they might see the beginning of yet another revolutionary idea concerning the Gas Industry.

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The CHAIRMAN, responding, thanked the Mayor for what he had said in reference to the Electricity Undertaking of the Corporation. They knew that in America and in some towns in this country gas and electricity ran together; and both industries undoubtedly served a most useful purpose. There was no reason why they should not work together; and speaking for his Board he could without hesitation say there would be nothing lacking on their part to maintain and foster the friendly relations that he believed existed between the Swansea Corporation and the Swansea Gas Company.

Mr. LEEDER then proposed the toast of "The Association," coupling with it the name of the President.

Mr. ABLETT gratefully acknowledged the loyalty of the Council, and of the Secretary, Mr. Octavius Thomas. These left him in such a position that he had little to do. When he came to Swansea 19 years ago, he had no idea that he would ever be President of the Wales and Monmouthshire Association, and be responding to such a toast. In Wales they were not a large body compared with other associations; but in relation to its membership, no association was stronger than they. Four years ago one of their members was President of the National Body, and this year Mr. Canning, of Newport, had that distinction. This was an honour that no other association was able to claim.

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The coal gas section of the works (capacity 3 million c.ft. per diem) was erected in 1923-24, and the water gas section (capacity 2½ millions) in 1926-27. Both sections have been fully described by Mr. W. H. Johns, the Engineer and Manager, who was responsible for the design, in his Presidential Address to the Wales and Monmouthshire District Association in November, 1924, and in his paper at the annual meeting at Cardiff in June, 1928.

Working results have been highly satisfactory, and the Directors have every reason to feel gratified with the choice of plant.

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The presentation of fifteen long-service awards to co-partners who have completed twenty-five years' service with the Company and of an inscribed silver salver to the Chairman of the Company, Mr. WILLIAM CASH, by the employees in appreciation of his services as Chairman of the Co-Partnership and Works Joint Committee, marked the Tenth Annual Co-Partnership Meeting of the Croydon Gas Company, held at the North End Hall, Croydon, on May 24 last.

After an enjoyable half-hour's community singing, the Chairman took the platform, supported by Directors, Mr. W. J. Sandeman (General Manager), Mr. W. Grogono (Engineer), Mr. F. F. Wood (Secretary), and Mr. M. O. Coates (Editor of the Company's Co-Partnership Magazine), and other representatives of the Works Committee, to submit the report and accounts of the scheme, and also the pension, widows', and orphans' fund, for the year ended March 31, 1932.

THE CHAIRMAN'S ADDRESS.

Mr. Cash, at the outset, took the opportunity of welcoming heartily all those present, on behalf of the Directors and Management. Running briefly through the more important items in the report, he pointed out that the bonus for the year was at the rate of 7 p.ct., this being the rate at which dividend on the sliding-scale stock of the Company was paid for 1931. The total amount of bonus credited to co-partners was £12,362, this being an increase of about £180 over the previous year's figure. Savings deposited during the year totalled £8452 and withdrawals for the same period £14,784, while the balance held by trustees for co-partners at March 31 was more than at the beginning of the year by £649, being a total of £41,896. He referred to the tendency of co-partners leaving their money on deposit in the Co-partnership Account, instead of availing themselves of investment in the Company's Stocks, and it had been suggested at Committee Meetings that each co-partner might purchase at least £1 of Stock per annum, and, in the course of a few years, accumulate a substantial holding, for he held that the paying of bonus actually did not mean co-partnership in its true and fullest sense.

He drew attention to the nominal amount of the Company's stock standing in the names of co-partners and annuitants, which was, on March 31, 1932, £27,900; and compared with some other gas undertakings this was not a very large sum. The Directors would like to see this sum increased.

Continuing, the Chairman stated that the total bonuses paid from 1909 amounted to £139,158, while savings and deductions for life assurance were £102,358 in the same period. The amount invested by co-partners in the Company's stock, also in the same period, totalled £28,649. He emphasized the fact that the usefulness of the scheme was dependent upon members allowing their bonuses to accumulate for investment and thus be of permanent benefit to them, and he urged them to try to put more money into the stock of the Company. Those who had done so had benefited considerably thereby, because the sliding-scale stock had been going steadily up, and to-day it was quoted at 122, whereas a year ago it was 108, and it was bearing interest at the steady rate of 7 p.ct.

He had to record the deaths during the year of two co-partners and four pensioners, while ten co-partners had retired on pension, and he wished these good health to enjoy their retirement for many years to come. Referring to the long-service awards, of which fifteen were to be presented that evening, Mr. Cash observed that the total number of awards presented to date was 207—to co-partners who had served 25 years and upwards. This was a very fine record.

NURSING SERVICE.

Only a year ago it was suggested that they might like to join the Croydon Nursing Service, and the membership of this was now 92. This Service was of great value, and the Committee strongly advised co-partners to take advantage of this scheme which was so useful in times of sickness. During the year the substantial sum of £239 had been paid to various hospitals, while the Company had also contributed an amount of £230 to the local hospitals during the year under review, making a total contribution of almost £470. The hospitals were very grateful for what they had done. During the year 170 hospital letters had been issued, making a total of 884 issued to date.

The circulation of the Company's Co-Partnership Magazine, under the Editorship of Mr. M. O. Coates, had reached a total of 1,368 in January last.

The Chairman went on to refer to the arrangements made for life assurance among the employees, remarking that such an arrangement had been in force for many years with a very good life assurance association, whereby every employee had to take out at least £100 worth of life assurance, and premiums were paid by deductions from salaries. By this scheme a 10 p.ct. reduction could be obtained on premiums. There were, of course, other assurance companies to which the same arrangement applied with whom employees could insure their lives if they wished, but their terms were not quite so good. There were 157 members of the staff insured in this way, and there was no need for him to tell them how excellent a thing life assurance was.

Turning to the accounts, Mr. Cash pointed out that the bonus declared amounted to a sum of £12,362, which was divided into two sums—contributions to pensions fund, £6,703, and co-partners' accounts, £5,658. This sum of £12,362 was brought into the co-partners' accounts and added to the balance at March 31, 1931, and the interest credited. If they took the amount deposited by co-partners of £8,452 and the amount added of £5,658, this made a total of £14,110 paid into the account apart from the amount required for the pension fund. The interest credited amounted to £1,793, bringing the total up to £15,904, so that actually the withdrawals were not as much as the interest and cash paid in, and the balance was again up.

The pension, widows', and orphans' fund began the year with a balance of £257,355, to which was added the members' contributions of £10,000 and the Company's contribution of double the members' contribution to the pension side of the Fund, together with a special contribution by the Company of another £10,000. They would now be able to see how the interest was steadily beginning to pile up, for during the year the total interest amounted to £12,350. On the other side it would be seen that 98 persons were drawing pensions, amounting to £9,369. One member had died, and ten had resigned. This left a balance of £290,433—an increase during the year of £33,000, a figure which they would all agree was very satisfactory. The fund was now rapidly approaching the £300,000 line, and they hoped that when they had their next valuation, which was due at the end of this year, the actuary would tell them that the fund was solvent—that was, that it would provide every man and widow with the pension to which they were entitled. This was due to the fact that for five years the Company had been adding the sum of £10,000 a year to the fund, and he was sure they had earned this satisfactory financial position. Of this £290,433 a sum of £242,366 was invested in the names of three Directors as Trustees. This was all invested in first-class securities, which they had valued at March 31 last and found them to be worth £246,792, which was extremely satisfactory in view of the falling values of investments to-day. The balance of the money was in the hands of the Company, and they were continually making further investments from time to time as the balance grew.

THE PROGRESS OF THE COMPANY.

Mr. Cash then went on to give an outline of the progress of the Croydon Company during the past year. A sum of £10,000 had been paid to the pension fund and a similar sum to the renewals fund to be applied to plant. There was an increased carry-forward on profit and loss account of £3,300. During the year they had converted some of their debentures to 5 p.ct., thereby reducing the charges for interest by £2,300 a year.

The event of the year was the taking over of the Oxted Gas Undertaking, which they did in May, 1931, and they sent gas through from the Waddon Works for the first time on Dec. 23, having in the interval gradually raised the calorific value of the gas supplied in Oxted. Last year for the first time the Company touched the 3,000 million c.ft. mark, so that they were now a fairly large undertaking. The consumption in the Oxted district was 40 millions a year—an amount of gas which would be produced at the Waddon Works in two days. During the year they laid 24 miles of new mains and took over 17 miles from Oxted. They put up additional carburetted water gas plant and a new section of intermittent vertical retorts, this being the latest method of manufacture they had adopted, and which they had found by experience very satisfactory.

He had also told the shareholders at the General Meeting of the good work done in the showrooms, over 10,000 additional appliances having been connected. He had also paid tribute to the staff, and they would not be surprised to hear that the shareholders had passed a hearty vote of thanks to the officers, staff, and workpeople for their services during the year.

Finally, Mr. Cash referred to the position of the Gas Industry generally. He thought that to-day the public were really beginning to appreciate the fact—and this included the investing public, the man-in-the-street, and the householder—that it was not a dying industry. They were in keen competition with electricity, oil, and other kinds of fuel both solid and otherwise, but they were fighting a good fight, and they were fighting a winning fight. There was undoubtedly throughout the country at the present time a great wave of economy which had a severe effect on the Gas Industry. Many people were trying to save a little here and a little there. And so far this year the temperature had not helped them, with the result that their output was stationary. He looked to them all to help in every way to save waste and to see that the best was done to fight competition. They were living in very difficult times, and in times when the position was even more difficult in other countries than it was here. As British men and women they should be proud of the way this country had met her difficulties. In America, Eastern Europe, and Germany the position was more difficult and strained than it was here. But England would pull through if they all pulled together and made the efforts required. They could congratulate themselves on the fact that they were in an industry which was indispensable, and which was therefore sometimes called a sheltered industry. What was coming in the future it was difficult to say, but they could all go forward and

no apprehension at his (the Mayor's) presence at that function, because the Municipal Electricity Undertaking and the Gas Company, as the lion and the lamb, could even lie down together. It would be a long time before they could do without gas in this country, and one day they might see the beginning of yet another revolutionary idea concerning the Gas Industry.

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The Chairman went on to refer to the arrangements made for life assurance among the employees, remarking that such an arrangement had been in force for many years with a very good life assurance association, whereby every employee had to take out at least £100 worth of life assurance, and premiums were paid by deductions from salaries. By this scheme a 10 p.ct. reduction could be obtained on premiums. There were, of course, other assurance companies to which the same arrangement applied with whom employees could insure their lives if they wished, but their terms were not quite so good. There were 157 members of the staff insured in this way, and there was no need for him to tell them how excellent a thing life assurance was.

Turning to the accounts, Mr. Cash pointed out that the bonus declared amounted to a sum of £12,362, which was divided into two sums—contributions to pensions fund, £6,703, and co-partners' accounts, £5,658. This sum of £12,362 was brought into the co-partners' accounts and added to the balance at March 31, 1931, and the interest credited. If they took the amount deposited by co-partners of £8,452 and the amount added of £5,658, this made a total of £14,110 paid into the account apart from the amount required for the pension fund. The interest credited amounted to £1,793, bringing the total up to £15,904, so that actually the withdrawals were not as much as the interest and cash paid in, and the balance was again up.

The pension, widows', and orphans' fund began the year with a balance of £257,355, to which was added the members' contributions of £10,000 and the Company's contribution of double the members' contribution to the pension side of the Fund, together with a special contribution by the Company of another £10,000. They would now be able to see how the interest was steadily beginning to pile up, for during the year the total interest amounted to £12,350. On the other side it would be seen that 98 persons were drawing pensions, amounting to £9,369. One member had died, and ten had resigned. This left a balance of £290,433—an increase during the year of £33,000, a figure which they would all agree was very satisfactory. The fund was now rapidly approaching the £300,000 line, and they hoped that when they had their next valuation, which was due at the end of this year, the actuary would tell them that the fund was solvent—that was, that it would provide every man and widow with the pension to which they were entitled. This was due to the fact that for five years the Company had been adding the sum of £10,000 a year to the fund, and he was sure they had earned this satisfactory financial position. Of this £290,433 a sum of £242,366 was invested in the names of three Directors as Trustees. This was all invested in first-class securities, which they had valued at March 31 last and found them to be worth £246,792, which was extremely satisfactory in view of the falling values of investments to-day. The balance of the money was in the hands of the Company, and they were continually making further investments from time to time as the balance grew.

THE PROGRESS OF THE COMPANY.

Mr. Cash then went on to give an outline of the progress of the Croydon Company during the past year. A sum of £10,000 had been paid to the pension fund and a similar sum to the renewals fund to be applied to plant. There was an increased carry-forward on profit and loss account of £3,300. During the year they had converted some of their debentures to 5 p.ct., thereby reducing the charges for interest by £2,300 a year.

The event of the year was the taking over of the Oxted Gas Undertaking, which they did in May, 1931, and they sent gas through from the Waddon Works for the first time on Dec. 23, having in the interval gradually raised the calorific value of the gas supplied in Oxted. Last year for the first time the Company touched the 3,000 million c.ft. mark, so that they were now a fairly large undertaking. The consumption in the Oxted district was 40 millions a year—an amount of gas which would be produced at the Waddon Works in two days. During the year they laid 24 miles of new mains and took over 17 miles from Oxted. They put up additional carburetted water gas plant and a new section of intermittent vertical retorts, this being the latest method of manufacture they had adopted, and which they had found by experience very satisfactory.

He had also told the shareholders at the General Meeting of the good work done in the showrooms, over 10,000 additional appliances having been connected. He had also paid tribute to the staff, and they would not be surprised to hear that the shareholders had passed a hearty vote of thanks to the officers, staff, and workpeople for their services during the year.

Finally, Mr. Cash referred to the position of the Gas Industry generally. He thought that to-day the public were really beginning to appreciate the fact—and this included the investing public, the man-in-the-street, and the householder—that it was not a dying industry. They were in keen competition with electricity, oil, and other kinds of fuel both solid and otherwise, but they were fighting a good fight, and they were fighting a winning fight. There was undoubtedly throughout the country at the present time a great wave of economy which had a severe effect on the Gas Industry. Many people were trying to save a little here and a little there. And so far this year the temperature had not helped them, with the result that their output was stationary. He looked to them all to help in every way to save waste and to see that the best was done to fight competition. They were living in very difficult times, and in times when the position was even more difficult in other countries than it was here. As British men and women they should be proud of the way this country had met her difficulties. In America, Eastern Europe, and Germany the position was more difficult and strained than it was here. But England would pull through if they all pulled together and made the efforts required. They could congratulate themselves on the fact that they were in an industry which was indispensable, and which was therefore sometimes called a sheltered industry. What was coming in the future it was difficult to say, but they could all go forward and

do their bit to ensure the continued success of the Croydon Gas Company.

Long-Service Awards.

The Chairman then presented long-service awards in the shape of a certificate, together with a gift of the value of £5 each, to the following co-partners who have completed 25 years with the Company:

L. L. Bull (Locomotive Driver, Manufacturing Department), F. W. Clements (Machine Hand, Manufacturing Department), C. H. Farley (District Foreman), W. Gatland (Cleaner, Katharine Street), P. Gosling (District Fitter), W. N. Goss (Fitter, Manufacturing Department), C. H. Hobbs (Plater, Manufacturing Department), A. E. Holloway (Showroom Manager), R. E. Moody (Prepayment Collector), A. E. Pugh (Clerk, Distribution Department), G. E. Reynolds (Weighbridge Clerk), A. J. Tofield (Prepayment Collector), A. Turner (Boiler Attendant), G. Warner (Labourer, Manufacturing Department), and S. H. Welstead (Clerk, Distribution Department).

A Presentation to the Chairman.

Mr. R. Richardson (Secretary of the Co-Partners' Representatives) proposed a vote of thanks to Mr. Cash. If there was one thing the Croydon Gas Company could congratulate itself upon it was in its choice of a Chairman. They had a Chairman unique in more ways than one; he stood for all that was just and fair and was a firm believer in the principles of co-partnership. He was the embodiment of all that a Chairman should be. With this, Mr. Richardson presented Mr. Cash with a silver salver, on which was inscribed: "Presented to William Cash, Esq., by the employees of the Croydon Gas Company in appreciation of his services as Chairman of the Co-Partnership and Works Joint Committee, 24th May, 1932."

In asking him to accept this gift, added Mr. Richardson, they asked him to esteem it not for its metallic value—for that was small—but far beyond that, as a recognition of the appreciation of them all. Might goodwill go with him for the way he had watched over their Company. They had sat together on the Co-Partnership Committee now for ten years, and he wished to thank the Chairman on behalf of the co-partnership representatives for the way he had guided that Committee and for the help he had given them, and he hoped he would be long spared to continue to assist them.

Mr. Cash, in returning thanks for the gift, said that they had given him a very difficult and a very agreeable task, because he was deeply touched indeed by this beautiful gift. Apart from the beauty of the gift there was that which lay behind it, and for that reason he would value it very much. He had always, he said, been a believer in the value of co-partnership in the fullest sense. It was the co-partnership spirit, however, to which he attached the most importance; they all worked together for the same object. He would like to tell them, and also those members of the Co-Partnership Committee, how this feeling which they tried to engender had been reciprocated on the other side. What he was most happy about was that if their representatives considered that any matter needed inquiring into or required adjustment they did not hesitate to bring it before the Committee. He was quite convinced that the success of the Croydon Gas Company was due to the co-partnership spirit. In conclusion, Mr. Cash referred to the fact that a new pavilion was shortly to be erected at the Company's sports ground, while the accommodation at Waddon was also to be improved by the conversion of the old gasholder into a stores below and a canteen above. Also there would be a new laboratory of which they were in great need. He thanked them from the bottom of his heart for the gift, which he would always value and appreciate enormously.

After light refreshments had been served, the remainder of the evening was devoted to a musical entertainment.

South Suburban Gas Bill

This Bill came up for consideration by the House of Commons Select Committee on Wednesday, May 25 (before Mr. David Reid, Chairman, Col. Ainsworth, Mr. Edward Williams, and Mr. James Duncan).

The main provisions of the Bill promoted by the South Suburban Gas Company are to authorize the transfer to the Company of the undertakings of the Sevenoaks Gas Company and the Tonbridge Gas Company on agreed terms. (The details were set out in the "Journal" for Dec 30, 1931, p. 840.)

Counsel for the Bill were Sir Lynden Macassey, K.C., Mr. Craig Henderson, K.C., and Mr. H. J. Hope. The only opponents were the Bromley Rural District Council, represented by Mr. H. R. Askew.

A map of the areas of supply of the three Companies showed that the Sevenoaks area adjoins the existing South Suburban area on its southern border, and the Tonbridge area adjoins the Sevenoaks area. The reason for the opposition of the Bromley Rural District Council was that, although twelve of its parishes are within the area of supply of the South Suburban Company, its only remaining parish, that of Knockholt, is within the existing area of supply of the Sevenoaks Company, and, if the Bill were passed, the consumers in Knockholt, when a supply was afforded them, would have to pay more than would consumers in the other parishes within the Rural District, because the provisions of the Bill include power to charge differential prices in the Sevenoaks gas area as compared with the South Suburban gas area. It was urged that Knockholt is similar to other parishes adjacent to it, but within the South Suburban area, from the point of view of gas supply, and that it should not subject to a differential in perpetuity, as was proposed by the Bill.

Sir Lynden Macassey, addressing the Committee on behalf of the South Suburban Company, said that there had been other matters on which opposition had been put forward, but the sweet reasonableness of the promoters and opponents had resulted in agreement in all cases except that of the Bromley Rural District Council concerning Knockholt.

He mentioned also a clause which was originally in the Bill to give the South Suburban Company extended powers concerning the investment of money in the securities of other companies. Such a clause was also inserted in other Bills. Recently, however, a joint Committee of the House of Lords and the House of Commons had heard evidence on this matter (see "Journal" for May 11, p. 317), and had reported that the provisions which the South Suburban Company and other large companies had inserted in their Bills were not such as they (the Committee) were disposed to agree to, but had recommended, as a matter of general legislation to apply to all gas undertakings, reduced powers of investment.

Having introduced the Bill, Sir Lynden dealt with the opposition of the Bromley Rural District Council. He said that the Sevenoaks Gas Company was entitled to charge up to its maximum price of 18·2d. per therm for gas supplied throughout the whole of its area, provided the price of coal was above 25s. per ton, but if the price of coal were below that figure, the maximum price for gas was 17d. per therm. For the purposes of charging, the Sevenoaks Company had divided the area of supply into three sections. In the urban district of Sevenoaks and the parish of Seal the existing price was 11d.; in the parish of Riverhead it was 11½d.; and in the remainder of the area (which included the parish of Knockholt) it was 12d. The proposals in the Bill, so far as the Sevenoaks area was concerned, were that after the amalgamation the South Suburban Gas Company should be able to charge varying differential prices within the three parts of the area, all of them being above the price charged within the existing area of the South Suburban Company. The additions proposed above the South Suburban area price were 1d. per therm in the urban district of Sevenoaks and the parish of Seal; 1½d. per therm in the parish of Riverhead; and 2d. per therm in the remainder of the area. The actual price over the greater portion of the existing South Suburban area—the exceptions being the areas of the Northfleet and Greenhithe Gas Companies, which were acquired in 1929, and to which differential prices now apply—is 9½d. per therm, so that on that basis the maximum charges which would be made in the three sections of the Sevenoaks area would be 10½d., 11d., and 11½d. respectively, so long as gas was supplied in the existing South Suburban area at 9½d. The result would be, said Counsel, to reduce the prices throughout the Sevenoaks area by ½d. per therm immediately on amalgamation.

In reply to a question by a member of the Committee, Counsel said that the Sevenoaks area would not remain a maximum price area, but would come under the basic price system applying to the South Suburban Company.

The Bromley Rural District Council objected to the price in the parish of Knockholt being 2d. per therm higher than in the general area of the South Suburban Company, which latter area included the remainder of the parishes in the Rural District, and it was asked that Knockholt should be in the same position with regard to gas charges as were the other parishes. That, said Counsel, was an utterly unreasonable and irrational proposition. The South Suburban Company had made a very careful survey of the parish of Knockholt, and the prospects of a demand for gas there were of the very thinnest. That was borne out by the fact that, although the Sevenoaks Company would have been able to charge up to 18·2d. per therm for gas supplied in that parish, they had never supplied gas there at all, because they could not make it worth their while to do so. The South Suburban Company was asking to be allowed to supply in Knockholt at a price only 2d. per therm above the price charged in the existing South Suburban area.

The Chairman asked if the Sevenoaks Company were under an obligation to supply in Knockholt if asked to do so.

Sir Lynden Macassey replied that Section 11 of the Gas-Works (Clauses) Act, 1871, applied to the South Suburban Gas Company, as to others, and under the terms of that Section they were only bound to give a supply to owners or occupiers of premises situated within 25 yards of a main if those owners or occupiers were prepared to enter into a contract as to the amount to be supplied over a period and the payment for the service pipes involved. The question as to whether a Company would or would not provide mains to give a supply in a district was left to the Company concerned as a matter of reasonable business policy. It would be altogether wrong if any person in a sparsely populated area could call upon a Gas Company to provide such length of main as was necessary to give him a supply of gas. The South Suburban Company, in their investigation of the Knockholt parish, had made the most liberal allowances for future possibilities, and had found that in one portion of that parish the proposed differential of 2d. would be

1d. per therm less than the amount necessary to make the supply of gas a reasonably economic proposition, and in the remainder of the parish the 2d. differential was 2d. less than the reasonable amount necessary to give a fair return. Therefore, the 2d. differential proposed was very reasonable. If the South Suburban Company had erred at all in regard to these proposals they had erred in the direction of placing a burden on the other consumers in their area, and it was questionable whether it was a burden which should be imposed upon them. It would mean that part of the cost involved in giving a supply to Knockholt under the terms of the Bill would be thrown on the shoulders of the existing consumers in the South Suburban area.

(To be concluded.)

South African Lighting Association, Ltd.

ANNUAL GENERAL MEETING

The Forty-Third Ordinary General Meeting of the shareholders of the South African Lighting Association, Ltd., was held in the Association's Offices at 48, Copthall Avenue, E.C. 2, on Wednesday, May 25, 1932—Mr. WILLIAM CASH, J.P., F.C.A. (Chairman of the Association), presiding.

The SECRETARY (Mr. William Cash, jun., M.A., F.C.A.) read the notice convening the meeting. The minutes of the last Ordinary General Meeting, held on May 27, 1931, were read, confirmed, and signed; and the Secretary read the Auditor's report concerning the accounts and balance-sheet.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the report and accounts, said that he thought he need do little more than just elaborate various paragraphs in the report they had in front of them.

They had had a loss during the year, which they deplored, in the death in January last of Mr. H. H. Hart, the Manager of the Grahamstown Branch. It was a matter of sincere regret to the Directors, and, he was sure, to the shareholders also, for Mr. Hart had served them very well for over twenty-five years. They had been able to promote one of the members of the staff in Port Elizabeth to take his place. Mr. Hart was well-known in Grahamstown and had been of great service to them.

In the first paragraph of the report it was stated that as from Oct. 1, 1931, the price of gas in Port Elizabeth was reduced by approximately 5d. per 1000 c.ft. by variations in the scale of discounts based upon the consumption of gas. This was some endeavour to increase the business in the district and to induce people to use gas to a larger extent. Their profits, of course, had in this respect only been affected so far as the last quarter of the year 1931 was concerned, and the full effect of what they had done would not be felt until the end of 1932—when the reduction would have been in operation for the whole of the year. This reduction was equal to the sum of about £1000 per annum.

A PROFIT ON EXCHANGE.

They had to report again that the conditions in South Africa and in Port Elizabeth were having an adverse effect on their business, and there had been a decline in the sales of gas compared with 1930 both in Port Elizabeth and Grahamstown. On the other hand, they had an extraneous advantage from the monetary position. South Africa remained on the Gold Standard, with the result that they had a profit on exchange amounting to as much as £658, which appeared as a separate item in the accounts. They had deliberately shown this as a separate item in order to keep the comparative figures of the business distinct. This profit on exchange was continuing, and at the present moment they were still making this profit on the money remitted to this country from South Africa.

The whole of the discount on debentures, continued the Chairman, issued in circumstances detailed in the Directors' report a year ago, when the amount was increased from £25,000 at 8 p.ct. to £30,000 at 6½ p.ct., amounting to £1425, had been written off. They might have spread this over ten years, but they had decided to write it off at once.

There remained a balance for disposal of £10,856, from which a dividend was proposed at the rate of 5 p.ct., less income-tax at 3s. 2½d. in the £, leaving a carry-forward of £6356—or a decrease compared with the previous year of £311. So considering the state of affairs in South Africa they had not done badly.

He would like to tell them that the officers had done their best to improve the position. There was a decrease in the sales of gas, and there were a few cases of comparatively large consumers going over to the use of oil. One substantial factory had shut down completely, while one hotel had changed over to electricity. On the other hand, another hotel had put in a new gas installation. Their Manager in Port Elizabeth, in writing home, stated that there had been a large falling off in the number of holiday visitors, while business men who had lived in the country all their lives had stated that the depression was the worst they had experienced. It was difficult to say whether business would improve during the next few months, but if it did the Association would benefit. The report from Grahamstown was similar, though perhaps a little more encouraging. The Manager here stated that there continued to be a steady call for gas appliances, and in this direction increased business had resulted. In a later letter he had stated that there was room for increased business in Grahamstown, and with a young and energetic official in charge this should take place as soon as the depressed conditions allowed.

CARBONIZING INSTALLATION IN GOOD ORDER.

They had put the whole of their retort installations in first-class order, and they now expected in 1932 to have no exceptional repairs. These better retorts gave a substantial increased output per colonial ton, while the Manager had also been able to keep the wages down still further. The cost of gas into holder at Port Elizabeth had been 3d. per 1000 c.ft. less than during the previous year. In Grahamstown the figures remained constant. Consumers at Port Elizabeth, however, showed no increase; they were, he thought, actually down by three. Although they had 84 new consumers they had lost some of their large consumers. Both branches had done well in the sales of coke, though tar had not done so well. One large sawmill, which used a lot of tar, had been closed. The fittings business also showed a considerable drop.

The amount of leakage remained about the same, though this was still comparatively high as judged by English experience.

In regard to the current year, they had had a cable in regard to the output for the first quarter of this year, and he was sorry to say that this still continued to show a decrease.

Turning to the profit and loss account, Dominion income-tax showed a reduction of £346. On the other side the Directors had again drawn only the reduced fees and not the full sum to which they were entitled; and they proposed to continue to do this. In regard to the floating assets and liabilities in South Africa referred to in a note on the Balance-Sheet, the assets exceeded the liabilities by something over £1000. Investments on account of reserve fund, less written off to date, amounted to £6786, and at to-day's date were worth their book value.

It would be noticed that in the Auditor's report reference was made to the adequacy of the renewal fund. That was put in to safeguard the Auditor, who was not in a position to say himself whether this fund was adequate or not. So far as the Directors were concerned, however, this fund was set aside to provide for retort renewals, receiving a regular contribution from the profit and loss account, and in the Directors' opinion it was adequate. They also had their undivided profits and premiums, so that their financial position was quite strong.

The Chairman then formally moved the resolution for the adoption of the report and accounts, which was seconded by Mr. HENRY WOODALL, J.P., M.Inst.C.E.

Mr. R. W. LONG referred to the question of leakage, and, in reply, the CHAIRMAN stated that this was a matter of trouble, and they were continually spending money trying to reduce their leakage. But they had a considerable length of main relative to their output. Their works were also capable of a very much larger output than they were called upon to supply, so that by way of percentage their leakage was high. Actually the quantity remained steady whatever the output might be.

The resolution was then put to the meeting and carried unanimously.

DIVIDEND.

The CHAIRMAN moved the payment of a dividend at the rate of 5 p.ct., less income-tax at 3s. 2½d. in the £, at the same time reminding shareholders that their dividends were subject only to the Dominion income-tax and not to the higher rate prevailing in this country.

Mr. T. N. G. JENNINGS seconded this resolution, which was agreed to.

RE-ELECTION OF DIRECTOR AND AUDITOR.

The CHAIRMAN thereafter moved the re-election of Mr. Jennings as a Director of the Company. Mr. Jennings, he said, had experience of South Africa, where he had been connected with one of the most important banks, and he had actually visited their works on more than one occasion. He had proved himself a most valuable and diligent Director, taking a very keen interest in their affairs.

Mr. JESSE F. SCOTT seconded the resolution, which was carried.

The Company's Auditor, Mr. Percival D. Griffiths, F.C.A., was then unanimously re-elected, at the usual fee of 40 guineas, on the proposition of Mr. W. ARNOTT, seconded by Mr. J. DONALDSON.

VOTES OF THANKS.

The CHAIRMAN said that it had always been the practice to put on record the appreciation of the work of the officials and staff. Mr. Pennington, their Engineer in Port Elizabeth, had only been with them a little while, but he had done good work, which had resulted in economies in the sense that he had cut down expenditure not unwisely but well. He had had a difficult time owing to the economic conditions over which he had no control. Mr. Sterley, their Secretary at Port Elizabeth, had held this position for many years and wrote home every week.

Their officers in South Africa were always trying to increase the Association's business.

Mr. DONALDSON seconded this vote of thanks to the staff in South Africa, which was carried unanimously.

Mr. R. LONG proposed a vote of thanks to the Chairman and Directors of the Association for looking after their interests during the year. Times were very trying, and they had the shareholders' sympathy, and they hoped there would be no more serious troubles than they had to face to-day.

Mr. H. B. SMITH, in associating himself with the remarks of the previous speaker, said he would like to include the staff in London in the vote of thanks.

The CHAIRMAN, acknowledging the vote, remarked that at their meetings they were continually trying to push their sales in South Africa, where they had the coal but where so little was done in regard to the supply of gas. There were only four towns in South Africa which had a gas supply—Cape Town, Johannesburg, Grahamstown, and Port Elizabeth. The town of Durban, with a population of over 50,000, had no gas supply at all.

Primitiva Holdings, Ltd.

The Third Ordinary General Meeting of Primitiva Holdings, Ltd., was held on Tuesday, May 24, at Beaver Hall, Garlick Hill, Cannon Street, E.C. 4—Mr. P. ASHLEY COOPER (Chairman of Directors) presiding.

The SECRETARY (Mr. Robert Grant) read the notice convening the meeting, together with the Auditors' report on the balance-sheet for the year ended April 30, 1932.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in the course of his address, said: Before proceeding with the business of the meeting, I should like to refer to the loss which our Company and its Associated Companies have suffered in the death in June last of Col. H. Le Roy-Lewis, C.B., C.M.G., D.S.O. Col. Le Roy-Lewis joined the Board with Mr. Jones and myself at the re-organization in 1925, and his exceptional business experience, particularly in public utility companies, was of great service to our Company. As stated in the report, it is not proposed to fill the vacancy at the present time.

THE ACCOUNTS.

Moving the adoption of the report and accounts and the declaration of a dividend at the rate of 4 p.ct. per annum, less income-tax, the Chairman said: Our revenue from investments has been reduced, and this is entirely due to loss on exchange suffered by our subsidiary companies. Owing to this exchange loss we are only able to recommend to you a dividend of 4 p.ct., which is the same as that paid by the Primitiva Gas Company, but in the case of the Holdings Company, we have earned a further £5410, which is added to the carry-forward.

Comparing the balance-sheet of the Primitiva Gas Company at Dec. 31, 1931, with that at the end of 1930, the principal changes are an increase in the land, buildings, and machinery account of some £244,000. Sundry debtors and stocks were decreased by £196,000, while investments increased by £107,000, and cash by £53,000. On the liabilities side £25,000 of debenture stock has been redeemed. Sundry creditors are down by £49,000. We now have the new item of loan—£226,000, which you will remember was borrowed from the Holdings Company. Substantial additions have been made to the various reserves, which now stand at over £1,255,000. We may, I think, claim that the balance-sheet shows a strong position, and that the progressive improvement noticeable in recent years has been well maintained.

The revenue of the Gas Company, in spite of the unfavourable trading conditions in Buenos Aires, is substantially up. There is only one blot on the profit and loss account, and that is the heavy amount which we have had to charge for loss on exchange. This amounts to £142,000, and but for that heavy charge, our net revenue available for dividend would have been larger than last year. As it is, after charging £75,000 to depreciation and renewals, and £10,000 to contingencies reserve, we were only able to declare a dividend of 4 p.ct., reducing the carry-forward by £7539. Except for the very heavy loss on exchange to which I have referred, the results show a steady improvement and may be considered satisfactory.

The outstanding feature during this last year is a further definite step in the process of control which under the guidance of our General Manager is exercised by our Accountants, our Engineers, our Public Service Manager, and our chemists. This is a time in which economies of all sorts have to be enforced, and I am glad to say that there is ample evidence that the application of better methods of operation is yielding satisfactory results.

Due to the smaller number of new consumers who have been connected to the Company's mains during the year, and to the general economic conditions prevailing, sales of appliances and orders for installations have suffered a very material drop with a consequent loss of profit. When conditions become more favourable this business will be recovered by the Company. The falling off in sales of appliances naturally affected the amount of business which we have been able to place with British manufacturers, and these manufacturers have also suffered from a heavy increase in customs duties which was placed upon their goods towards the end of 1931.

Owing to economic disturbances with which you are familiar the year 1931 has been a difficult one for the Management. Nevertheless gas has continued to gain in popularity, and sales have increased by over 9 p.ct. and consumers by 5606. Financial stringency has induced our customers to economize in gas, so that the consumption per consumer has decreased.

The Buenos Aires Industrial Supply Company has again made a good profit, and has contributed to our revenue. The Province of Buenos Aires Gas Company did better than in 1930, but as in previous years, rather than declare a dividend, the profit has been taken to strengthen the balance-sheet.

I am always anxious to tell you so far as I can see it how our Company is likely to fare in the forthcoming twelve months. But I confess that the factors of life in Buenos Aires and the course of Argentine exchange, both of which are outside our control, and both of which may change considerably, play so large a part in our results that it is impossible to make any close forecast. But what must count in the long run is the position of the producer in the camp. That is the situation you must watch. And watching it as I do I am satisfied that, in spite of these difficult times through which everyone is passing, you will find Argentina gradually but surely returning to her old prosperity.

The CHAIRMAN then formally moved the resolution for the adoption of the report and accounts and the declaration of a dividend at the rate of 4 p.ct. per annum, less income-tax at the rate of 5s. in the £.

This was seconded by Mr. FRANK H. JONES, M.Inst.C.E., and carried unanimously.

The CHAIRMAN proposed the re-election of Mr. W. Howard-Williams, the Director retiring by rotation, and this was seconded by the Rt. Hon. Viscount ST. DAVIDS, and carried.

CONVERSION OF SHARES INTO STOCK.

The CHAIRMAN thereafter moved that 2,399,651 ordinary shares of £1 each in the capital of the Company numbered 1 to 2,399,651 inclusive when issued and fully paid up be converted into ordinary stock.

Mr. HOWARD-WILLIAMS seconded the resolution, which was agreed to.

Hong Kong and China Gas Company, Ltd.

The Annual General Meeting of the Shareholders was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C., on Monday, May 23, 1932—Mr. ROBERT H. GLEN, F.C.A., Chairman, presiding.

The SECRETARY (Mr. A. C. Pullen) read the notice convening the Meeting and the Auditors' Report.

The CHAIRMAN: Gentlemen, a copy of the Report and Statement of Accounts having been sent to each Shareholder, I will ask you to take the same as read.

At our Meeting last year, I mentioned that many difficulties had been created by the abnormal position in regard to Exchange and, although the dollar improved somewhat during the last three months of 1931, the average rate for the year was 1s. 0¾d. It may be of interest if I again mention to you the rates on which the local Accounts were based for 1919 and subsequent years:

	s.	d.			s.	d.	
1919	4	1	per dollar	1926	2	2⅛	per dollar
1920	4	4	,,	1927	1	11⅞	,,
1921	2	7½	,,	1928	2	0¼	,,
1922	2	6	,,	1929	1	10¼	,,
1923	2	3⅜	,,	1930	1	4 7/16	,,
1924	2	4½	,,	1931	1	0¾	,,
1925	2	3¼	,,				

On 31st December last, the dollar stood at 1s. 5¼d., but to-day is quoted at 1s. 2⅞d.

The price of our gas remains at the figure to which it was raised on 1st May, 1931.

The Government Scheme for bringing water across the Har-

bour by Pipe Line has continued to be very successful and there has been no repetition of the water shortage of 1929, this water question has a bearing, of course, upon the use of our Geysers.

We regained a further 1½ million in gas sales at Hong Kong and we have also increased the sales at Kowloon by about 7 million cubic feet.

The question of the capacity of our Kowloon Works has been under constant consideration, we do not anticipate any difficulty during the next winter with the Plant now available, but must soon decide whether a scheme of reconstruction at the present Site shall be undertaken, or, if a transfer to new and larger Works on land to be acquired is the better proposition. The Board asked Mr. A. A. Johnston, one of your Directors, to visit the Colony at end of last year and Mr. Johnston's conclusions, based on his experiences and investigations on the spot, will be of much help in this matter.

The number of Street Lamps lighted by gas showed a slight increase to 2491 and constant efforts are maintained to improve the standard of efficiency. This branch of our business is very important.

On referring to the Accounts, additions to Land Works and Plant Account amount to £2,314, this being for Mains and Services.

In the Revenue Account, Coal Carbonised is $336,346, as against $220,106 or about 50 per cent. up. The carbonising results were much improved, but the dollar cost of coal per ton was considerably higher through Exchange, and, further, we made considerably less Water Gas.

The charge for C.W. Gas was only $19,405 for the reason just given.

Working Expenses are $12,241 up. This is more than accounted for by the differences in Exchange when paying European Staff at current rates. They were formerly paid at the fixed rate of 1s. 10d. per dollar.

Maintenance of Retorts and Mains are both slightly down, Maintenance of Works is considerably less, partly on account of a special shipment of material for Water Gas Plant in 1930.

The accounts grouped under Fitting Repairs are about the same. Wages charged here in connection with Loan Appliances were increased, but a considerable debit in previous year for ordinary Fitting work does not recur

Cost of Publicity fell from $8,504 to $5,671.

Passages Account went up from $3,302 to $11,819. Various members of the Staff were on leave and the sterling cost of the passages was paid at low rates of exchange.

Bonus to Staff, &c., was $21,555 as compared with $9,651. The Scheme provides for computation of Bonuses on dollar profit, irrespective of the value of the dollar.

Depreciation of Meters, Stoves, &c., on hire went up from $39,934 to $49,040, the difference being mostly exchange.

A new charge appears on this occasion, viz., Alterations to Offices, Quarters, Stores, &c., $39,187. The Hong Kong Offices were formerly on the first floor, but the ground floor of the building has now been adapted for this purpose and the floor above made into a Foreman's Flat, his late quarters being demolished. Stores have been re-arranged and various old buildings removed, the available yard space being much increased thereby. This re-arrangement will greatly assist the efficient running of the Works.

On the credit side, Gas Rentals increased from $627,593 to $860,093, due, mostly, to increased rates.

Meters and Fittings Rentals were $79,672 as compared with $63,402—our charges were put up because of Exchange.

Residuals realised $120,974 as against $106,157. We carbonised 1,168 tons coal more at Hong Kong, thus more coke was available and a better price for same was obtained.

The Company has opened new Showrooms in an excellent position in Des Voeux Road in place of those formerly in Ice House Street. The New Showrooms are well fitted up, and are situated in the heart of the shopping centre of Hong Kong and should serve to keep the Gas Company prominently before the eyes of residents in the Colony.

The profit shown in the London Revenue Account, viz., £8,177, is much less than we had hoped, in spite of all efforts made to counteract the abnormal Exchange.

The charge for Income Tax in Net Revenue Account is very small.

I think further comments on the Accounts are not necessary, but shall be pleased to answer any questions you may desire to put to me thereon. The Balance of Net Revenue is £43,331 and we recommend a Dividend for the year at the rate of 10 per cent. per annum, less Income Tax.

The Directors propose to send a special letter to Mr. Harold E. Stone, our Engineer and General Manager, conveying their appreciation and thanks for his work and efforts since he went out to Hong Kong at latter end of 1930 and the Board would like the general body of Shareholders to be associated with this.

I now have pleasure in moving that the Report and Accounts be received and adopted, and, before I sit down, I should like to say how we all welcome the presence here of our distinguished Shareholder, Sir Robert Ho Tung.

Mr. A. A. JOHNSTON seconded the Resolution. In the course of the ensuing discussion Mr. R. M. Long congratulated the Board on the Dividend recommended and asked as to the Company's future prospects. The Chairman replied that these were largely bound up with the growth of Kowloon. Sir Robert Ho Tung expressed the indebtedness of the Shareholders for the explicit statement just made by the Chairman and said the Shareholders would certainly wish to be associated with the Board's proposal to specially convey the Company's thanks to the Manager. Mr. A. E. Hayes also asked to be allowed, as a Proprietor, to join in the appreciation of Mr. Stone's services. The motion was carried unanimously.

The CHAIRMAN then moved the following Resolution:

> " That a Dividend at the rate of Ten per cent. per annum, less Income Tax, be declared for the year ended 31st December, 1931, the Warrants to be made payable on the 27th instant "

which was seconded by Major Heriot R. Glen and carried unanimously.

The re-election of Major Heriot R. Glen as a Director was proposed by Mr. A. A. Johnston, who stated that, from his knowledge of Major Glen in this and other Companies, he could emphasise how thoroughly experienced and qualified for the position Major Glen is. Sir Robert Ho Tung seconded the Resolution which was unanimously carried.

Mr. R. M. LONG proposed the re-election of Messrs. Cash, Stone, & Co. as Auditors for the ensuing year at their usual fee, which was seconded by Mr. A. E. Hayes and carried unanimously.

The CHAIRMAN proposed a vote of thanks to the Staff in Hong Kong and London, and, after again referring to the Manager's services, mentioned the loyal and helpful co-operation of the other officials in Hong Kong with Mr. Stone. He said all, and particularly the Board, knew the energetic and hard work of the Secretary. Sir Robert Ho Tung seconded the Resolution, which was carried unanimously. Mr. Long proceeded to move a vote of thanks to the Chairman and Directors, which was seconded by Sir Robert Ho Tung and carried. The proceedings then terminated.

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Kettering Gas Bill has been referred to a Committee on Unopposed Bills which is meeting to consider it on June 2 at 1 p.m.

The Scarborough Gas Bill has been read a third time, with the amendments, passed, and returned to the House of Commons.

The Gas Light and Coke Company's Bill has been read a third time, passed, and sent to the House of Commons.

The Oakham Gas and Electricity Bill has been put down for second reading.

House of Commons.

Private Bills.

The Gas Light and Coke Company's Bill has been read a first time and referred to the Examiners.

The South Suburban Gas Bill, the Commercial Gas Bill, and the Mid-Southern Utility Bill have been reported, with amendments, from the Committees to which they had been referred.

Gas Undertakings Bill.

This Bill, which has passed the House of Lords, has been read a first time in the Commons, and is awaiting second reading.

Special Orders.

Plans have been deposited in connection with the Rotherham Corporation (No. 2) Gas Order.

An Order made on the application of the Shanklin Gas Company has been approved by the House.

Mid-Southern Utilities Bill

This Bill was considered by a House of Commons Committee presided over by Mr. David Reid on May 26 and 27, and was eventually ordered to be reported for third reading.

Mr. Jacques Abady represented the promoters—the Mid-Southern District Utilities Company, and the only opposition came from the Surrey and West Sussex County Councils, who were represented by Mr. Craig Henderson, K.C., and Mr. Hope. The promoters have powers to supply water, gas, and electricity in various parts of Surrey, Berkshire, and Southampton, the total area being some 600 sq. miles, of which 573 sq. miles are of a rural character. One of the objects of the Bill was to change the name of the Company to the Mid-Southern Utilities Company, and so far as gas was concerned it was sought to apply section 40 of the Gas-Works Clauses Act for the recovery of rent or money due to the Company for the hire or fixing of gas and electricity fittings. There was no opposition to this.

The opposition of the two County Councils was in respect of fixing electrical sub-stations.

The Company obtained powers in 1931 to invest in other electricity or gas companies already established, but the Committee sanctioned an extension of these powers to enable the Company to subscribe for shares in similar Companies about to be formed.

Report of the Livesey Professor at Leeds

Prof. J. W. Cobb, C.B.E., B.Sc., F.I.C., Livesey Professor at the University of Leeds, has submitted his report for the session 1930-31 to the Chairman (Mr. C. F. Tetley, M.A., LL.D.) and members of the Livesey Advisory Committee on the work of the Department of Coal Gas and Fuel Industries (with Metallurgy):

This is the first complete session in which the Department has had at its disposal the whole building, of which it formerly occupied a part, and has reaped the advantage of the extension, re-conditioning and re-arrangement which have been carried out. The improved equipment and services have been greatly appreciated. This re-construction was aided by contributions made through the University Appeal Fund, of the Gas Industry, and other friends of the Department, amounting to £8055.

The extended accommodation has already been largely taken up, and indeed in some directions it is clear that congestion may be expected. This is due to the increased entry of students during the last session, following presumably upon a publicity which some of the work of the Department has received, and the recognition of the careers which have been opened to its graduates. The present severe industrial depression is limiting the number of openings to young men at the moment, but it is significant that only one of our graduates is known to be actually unemployed.

When considering the trend of industry to increase of technical control in all its operations, and to development through scientific research work, it is reasonable to expect that any revival of trade will re-create that active demand for our graduates in excess of supply which we have been accustomed to experience.

This is the first session in which a student in the Department has held the newly instituted Cartwright Holmes Scholarship, which was awarded in 1930 to G. E. Hall, of the Leeds Grammar School. The Corbet-Woodall Scholarship was awarded at the same time to F. Bell, from the Laboratory of the Leeds Corporation Gas Department.

Another development of note has been the presence in the Department of two industrial research students working for private firms. This facility which the University provides is hardly utilized as freely as it might be. A commercial concern may have a problem the investigation of which is inconvenient on its own premises, either because of limitations of staff or accommodation, or because the work needs a close and continuous application which is impracticable under works conditions. By the appointment of a private industrial research student it is possible for the firm to secure the advantages of the resources and equipment of the University without incurring capital expenditure on its own account.

Students.

The analysis of the number of students in the Department may be stated thus:

—	1929-30.	1930-31.	1931-32.
Full-time students—			
1st year B.Sc. course	1	10	6
2nd ,, ,, ,,	4	2	11
3rd and 4th years B.Sc. course	8	5	6
Post graduate degree students	1	3	5
,, ,, diploma ,,	..	1	1
Diploma students	2	2	1
Industrial research students	..	1	1
Occasional students	1	1	1
	17	25	32

It is seen from the figures quoted for 1931-32 that the increased entry of 1930-31, the session under review, has been maintained in the new session 1931-32.

The recognition inside and outside the University of the value of a knowledge of fuel processes has resulted in the increased attendance of students from other Departments of the University on the Introductory or General Course in Fuel. Engineering students not only attend the Introductory Fuel Course but are now able to supplement their lecture instruction in Metallurgy by Practical Metallography in the laboratory. This is one result of the increased laboratory accommodation. Moreover, all Gas Engineering students now receive lecture instruction in Metallurgy, and this is obviously advantageous when the uses of gaseous fuel in heat treatment of metals is rapidly growing. Clearly the fuel expert should be able to appreciate the requirements of an engineer or metallurgist who seeks his advice.

Classes.

All ordinary day classes have been held, and no substantial change has been made in the curriculum for the degree or diploma in Gas Engineering or in Fuel and Metallurgy.

Twenty-six external students in 1931 attended the special evening lectures, in addition to full-time students of the Department. The numbers from outside in attendance on these courses are not nearly so large as might reasonably be expected, but are drawn from a wide area. These special evening courses are given mainly by lecturers holding responsible industrial positions, who speak from first-hand knowledge of the principles and most modern practice in their subjects. They form a valuable integral part of the course of each full-time student, but are so arranged as to be available for outside students also.

Staff.

Several changes in staff have to be reported.

Dr. A. C. Monkhouse, who was Research Chemist for the Liquor Effluents and Ammonia Sub-Committee of the Institution of Gas Engineers, resigned his post during last session on his appointment as Inspector under the Alkali Acts, and has been placed in charge of the West of England District. He was succeeded by Dr. A. Key, who has carried on the work with the assistance of Mr. Etheridge.

Dr. A. H. Eastwood (late Gas Research Fellow) has also been appointed temporarily to assist Dr. Key in an investigation, carried on in this Department, into the optimum conditions of production of ammonium bicarbonate.

Mr. C. B. Bolland, B.Sc., resigned in 1931 his appointment as a research assistant with a grant from the Fuel Research Board on his appointment to the staff of the South Yorkshire Chemical Company.

Dr. E. Spivey, Ph.D. (Leeds), was appointed to succeed him.

In the Autumn of 1931 Mr. T. H. Blakeley, B.Sc., was appointed to the Gas Research Fellowship vacated by Dr. Eastwood.

Research.

Apart from the valued association with the Institution of Gas Engineers, the research work of the Department has continued to be assisted by substantial grants from the Department of Scientific and Industrial Research (Fuel Research Board) which enable important problems to be investigated with a continuity which would otherwise be impossible.

Donations.

During the Session we have received a set of samples of special refractory materials, useful for lecture and museum purposes, from the Morgan Crucible Company, Ltd., and of materials used in our researches from various firms, including the Leeds Fireclay Company, Moler Products, Ltd., the Derbyshire Silica Firebrick Company, and Messrs. Tate & Lyle.

Appointments of old students during the period under review:

C. B. Bolland, B.Sc.	South Yorkshire Chemical Company, Ltd., Parkgate.
A. Gillies, B.Sc.	South Yorkshire Chemical Company, Ltd., Parkgate
T. Spikins, B.Sc.	Assistant Engineer, Shanghai Gas Company.
J. N. Hazeldon, M.Sc.	Messrs. W. C. Holmes & Co., Ltd., Huddersfield.
J. W. Townsend, B.Sc.	The Gas Light and Coke Company, London.
J. J. Priestley, B Sc.	Messrs. W. C. Holmes & Co., Ltd , Huddersfield.
W. Etheridge, B.Sc.	Research Assistant Effluents Research Committee, Institution of Gas Engineers.
A. C. Monkhouse, Ph.D.	Inspector under the Alkali Acts.
J. K. Simpson, B.Sc.	Shanghai Gas Company.

GRADUATES.

1931 (June).

Ph.D.	A. H. Eastwood, B.Sc.
B Sc. (Honours) 1st Class	T. H. Blakeley, B.Sc. (Le Blanc Medal).
B.Sc. (Ordinary)	J. E. Knight.
	G. A. Thompson.
Diploma in Gas Engineering	H. G. Simpson, Ph.D (London).

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see later pages.]

Issue	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 27.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅞	7⅞	Alliance & Dublin Ord. ...	100—105	...	103—104½
374,000	„	Jan. 4	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
557,655	„	Mar. 14	7	7	Barnet Ord. 7 p.c.	127—132	...	...
300,000	1	Apl. 29	1/4⅛	1/9⅜	Bombay, Ltd.	15/-—20/-	...	...
177,750	10	Feb. 29	9	9	Bournemouth 5 p.c. ...	16½—17½	+1¼	16⅞—17⅛
500,050	10	„	7	7	Do. B 7 p.c. ...	12½—13½	...	13⅛
439,160	10	„	6	6	Do. Pref. 6 p.c. ...	11½—12½	+½	11½—12
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	62—67	...	...
162,025	„	„	4	4	Do. 4 p.c. Deb. ...	83—88	...	—
210,000	„	„	5	5	Do. 5 p.c. Deb. ...	105—108	...	—
					Brighton, Hove, & Worthing			
357,900	„	Mar. 14	7½	7½	6 p.c. Con. ...	122—127	...	125½—127
540,000	„	„	6½	6½	Do. 5 p.c. Con. ...	109—114	...	113½—114
195,500	„	„	6	6	Do. 6 p.c. B Pref.	114—119	...	117—118½
1,287,500	„	Feb. 29	5	5	Bristol 5 p.c. max.	97—99[a]	+1	...
120,420	„	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	83—86[a]	...	...
217,870	„	„	4	4	Do. 2nd 4 p.c. Deb. ...	83—86[a]	...	...
328,790	„	„	5	5	Do. 5 p.c. Deb.	99—101[a]	...	...
855,000	„	Apl. 4	7	8	British Ord.	113—118	...	116—117½
100,000	„	Jan. 4	7	7	Do. 7 p.c. Pref.	115—120	...	...
120,000	„	„	4	4	Do. 4 p.c. Red. Deb. ...	77—82	...	80
450,000	„	„	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...	...
160,000	„	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	100—105	...	...
100,000	10	May 23	6	6	Cape Town, Ltd.	7⅞—8⅛[†]	—¼	...
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7[*]	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	76—81	...	...
626,860	„	Feb. 15	6	6	Cardiff Con. Ord.	100—105	+8	...
237,860	„	Jan. 4	2½	5	Do. 5 p.c. Red. Deb.	97—102	...	...
157,150	„	Feb. 15	5	6½	Chester 5 p.c. Ord.	87—92[b]	...	...
98,936	1	May 23	2/-	2/-	Colombo, Ltd. Ord.... ...	26/-—31/-[*]	—1/-	...
24,500	1	„	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	17/-—19/-[*]	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/-—15/-	...	...
296,053	1	„	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/-—15/-	...	...
2,078,280	Stk.	Feb. 15	6	5½	Commercial Ord.	96—99	...	98
475,000	„	Dec. 14	3	3	Do. 3 p.c. Deb. ...	61—64	...	...
807,560	„	Feb. 15	7	7	Croydon sliding scale ...	118—123	...	122
469,590	„	„	5	5	Do. max. div.	82—87	...	...
600,000	„	Jan. 4	5	5	Do. 5 p.c. Deb.	100—105	...	...
542,270	„	Feb. 29	7	10	Derby Con.	117—122[c]	...	...
55,000	„	Jan. 4	4	4	Do. 4 p.c. Deb.	65—70[c]	...	...
209,000	„	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	75—80	...	76½
179,500	„	Feb. 29	5½	5½	East Surrey Ord. 5 p.c. ...	93—98	...	...
155,019	„	Jan. 4	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
1,009,180	„	Mar. 14	†4	†6½	European, Ltd.	90—100	...	92½
19,405,992	„	Feb. 15	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	20/9—21/9[f]	...	20/10½—21/4½
2,600,000	„	„	3⅛	3⅛	Do. 3½ p.c. max.	65—69	...	...
4,477,106	„	„	4	4	Do. 4 p.c. Con. Pref. ...	83—87	+1	85½—87
6,102,497	„	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	66—69	...	66⅛—68
3,642,770	„	„	5	5	Do. 5 p.c. Red. Deb. ...	104—107	...	105⅛—106½
2,500,000	„	„	4½	4½	Do. 4½ p.c. Red. Deb. ...	100—103	+1	101½—103
162,280	„	Feb. 29	10	10	Harrogate Cons. 10 p.c. max.	...	...	...
83,500	„	Mar. 14	7	7	Hastings & St. L. 5 p.c. Conv.	103—108	...	...
958,740	„	„	5½	5½	Do. 3½ p.c. Conv.	82—87	...	...
70,000	10	9 Oct. '30	⅛	10	Hongkong & China, Ltd. ...	11—12	...	...
213,200	Stk.	Feb. 29	6	6	Hornsey Con. 3½ p.c. ...	87—90	...	...
5,600,000	„	Oct. 30	25	15	Imperial Continental Cap.	165—170	+½	168—170
223,130	„	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	72—77	...	...
235,242	„	Mar. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	134—139	...	...
2,145,907	„	Feb. 29	6	6	Liverpool 5 p.c. Ord. ...	106¼—107¼[b]	+¾	...
245,500	„	—	—	5	Do. 5 p.c. Red. Pref. ...	97—102[b]	...	...
306,083	„	Jan. 15	4	4	Do. 4 p.c. Deb. ...	85—90[b]	...	...
165,736	„	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	124—129	...	...
56,176	„	Jan. 4	3	3	Do. 3 p.c. Deb. ...	57—62	...	...
75,000	5	Nov. 30	†10	†10	Malta & Mediterranean ...	7—8	...	...
					Metropolitan (of Melbourne)			
892,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	80—85	+3	...
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	„	„	4	4	Do. 4 p.c. Cons. Pref.	76—81	+1	78
112,126	„	g	4	4	Do. 4 p.c. Deb. ...	78—83	+1	...
148,955	„	g	5	5	Do. 5 p.c. Deb. ...	100—105	+3	...
675,000	„	May 21	16	16	Montevideo, Ltd.	50—70	—5	...
2,061,315	„	Feb. 29	5	5½	Newcastle & Gateshead Con.	19/-—20/-[d]	...	...
682,856	„	„	4	4	Do. 4 p.c. Pref. ...	78—80[d]	...	...
691,705	„	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	70—72[d]	+2	...
277,285	„	Oct. 30	5	5	Do. 5 p.c. Deb. '43...	99—101[d]	...	...
199,940	„	Mar. 14	7½	7½	North Middlesex 6 p.c. Con.	118—123	+12	...
896,160	„	Feb. 15	5	5	Northampton 5 p.c. max. ...	78—83	...	...
300,000	„	Apl. 18	9	7	Oriental, Ltd.	85—95	...	...
205,162	„	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	127—132	...	129½
504,416	„	Feb. 15	8	8	Portsm'th Con. Stk. 4 p.c. Std.	126—131	...	...
241,446	„	„	5	5	Do. 5 p.c. max. ...	78—83	...	...
114,000	„	Feb. 15	5	5	Preston 5 p.c. Pref.	94—99	...	...
686,312	„	Jan. 18	4	4	Primitiva 4 p.c. Rd. Deb. 1911	77—82	...	80⅞—80½
389,813	„	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	80—81
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,786,968	Stk.	Apl. 4	6	6	Sheffield Cons.	101—103[e]	...	...
95,000	„	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
193,201	„	Feb. 29	8½	5	Shrewsbury 5 p.c. Ord. ...	99—104	+4	...
90,000	10	June 11	15	15	South African	3—5	...	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	104—107	...	104½—106
1,135,812	„	„	6	6	Do. 6 p.c. Irred. Pf.	115—120	...	118—120
1,895,445	„	Jan. 4	3	3	Do. 3 p.c. Deb. ...	65—69	+2½	67—68½
1,000,000	„	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	102—105	...	...
91,500	„	Feb. 29	8½	8½	South Shields Con.	129—131[d]	...	...
1,543,795	„	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	102—107	...	106—106½
300,000	„	„	5	5	Do. 5 p.c. Pref.	97—102	...	99—100½
668,887	„	Jan. 4	5	5	Do. 5 p.c. Deb.	102—107	+1	104½—105½
647,740	„	Feb. 29	5	5	Southampt'n Ord. 5 p.c. max.	79—84	...	...
121,275	„	„	4	4	Do. 4 p.c. Deb.	77—82	...	80
250,000	„	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	98—102	...	...
200,000	„	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	„	Feb. 29	6½	6½	Tottenham and District Ord.	106—111	...	...
300,000	„	„	5½	5½	Do. 5½ p.c. Pref. ...	102—107	...	...
199,005	„	Dec. 14	4	4	Do. 4 p.c. Deb.	77—82	...	...
85,701	„	Apl. 4	6	6	Tuscan, Ltd., 5 p.c. Red. Db.	70—75	...	...
					Uxbridge, Maidenhead, &			
346,069	„	Feb. 29	7	7	Wycombe 5 p.c.	108—113	+7	...
88,330	„	„	5	5	Do. 5 p.c. Pref. ...	95—100	...	96
					Wandsworth and District:			
1,322,220	„	Feb. 29	7	7	Consolidated	117—122	...	121—122
971,373	„	„	5	5	Do. 5 p.c. Pref.	98—103	...	101½—102
1,167,964	„	Jan. 4	5	5	Do. 5 p.c. Deb.	103—106	...	106½
158,400	„	Feb. 29	5	6h	Winchester W. & G. 5 p.c. Con.	85—90	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. *h* Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

STOCK ISSUES.

By Order of the Directors.

THE RUGBY GAS COMPANY.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

£25,570

5½ PER CENT. PREFERENCE STOCK.

Minimum Price of Issue, Par.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Tuesday, the 14th of June) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

TROTTER, HAINES, & CORBETT LIMITED

BRETTEL'S ESTATE

FIRE-CLAY & BRICK WORKS

STOURBRIDGE

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

THE CHAIRMAN,

SCHOOL FOR THE BLIND

(Founded 1838).

Swiss Cottage, LONDON, N.W. 3

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see earlier page.]

Conditions on the Stock Exchange remained practically unaltered last week. At the outset, adverse rumours led to a selling movement on the part of speculators in the gilt-edged section which caused a partial set-back in the value of these securities, but the general tone remained firm, and closing prices showed very little change compared with those of the previous week. Industrials, on the other hand, were dull and listless, though a perusal of some recent dividend announcements shows that a large number of the leading concerns are maintaining their dividend payments in spite of the difficult conditions.

The Gas Market continued its popularity, and was again a contrast to most of the other departments. As is so often the case in this section, the amount of stock available was very short of the demand, and inquiries for some of the ordinary variety which are closely held led to spectacular improvements. The chief of these was a gain of 12 points in North Middlesex 6 p.ct. to 120½, which, on the basis of last year's distribution of 7½ p.ct., still gives a satisfactory yield of nearly 6¼ p.ct. Cardiff consolidated followed with a rise of 8 points to 102½, while Uxbridge 5 p.ct. moved up 7 points to 110½. Shrewsbury 5 p.ct., with a gain of 4 points, was officially quoted for the first time in October last at 74½, and since that date has appreciated in value by no less than 27 points to 101½. Among debentures, the Mid-Southern Utility 5 p.ct. and Metropolitan (of Melbourne) 5½ p.ct. both rose 3 points to 102½ and 82½ respectively. Apart from *ex* div. markings, the only fall last week was in Montevideo ordinary, the widening of the quotation resulting in a drop of 5 points to an average of 60.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *May* 30.

Prices of tar products remain unchanged.

Pitch is 95s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b. according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 7d. per gallon; pure benzole, 1s. 8d. per gallon; 95/160 solvent naphtha, 1s. 4½d. to 1s. 5d.; and pyridine bases, 3s. 9d. to 4s. per gallon—all naked at makers' works.

Tar and Tar Products in the Provinces.

May 30.

The average prices of gas-works products during the week were: Gas-works tar, 34s. 6d. to 39s. 6d. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 10d. to 1s. 10½d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 2½d. to 3d.; low gravity, 1¼d.; Scotland, 2½d. to 3d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 8d. to 1s. 9d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May* 28.

Orders are, if anything, more numerous, and values of most products are steady. Creosote oil continues to attract considerable attention in the home market.

Crude gas-works tar.—Actual value remains at 55s. to 60s. per ton *ex* works.

Pitch.—Inquiries for forward shipment are plentiful, but offers are difficult to secure. Export value is nominal at 82s. 6d. to 87s. 6d. per ton f.o.b. Glasgow, while home price is now 87s. 6d. to 92s. 6d. per ton *ex* works in bulk.

Refined tar to Ministry of Transport Specification is unchanged at 4¼d. to 4¾d. per gallon f.o.r. makers' works in buyers' barrels.

Creosote oil.—The demand for home trade continues strong with values steady. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all f.o.r. in bulk.

Cresylic acid.—This remains a dull market and prices are purely nominal. Pale, 97/99 p.ct., is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99 p.ct., 1s. to 1s. 1d. per gallon; and pale, 99/100 p.ct., 1s. 3d. to 1s. 4d. per gallon—all f.o.r. naked.

Crude naphtha.—Available supplies command 4½d. to 5d per gallon, according to quality and district.

Solvent naphtha.—Quotations are easy at 1s. 2½d. to 1s. 3½d. per gallon for 90/160 grade, and 11d. to 1s. per gallon for 90/190 grade.

Motor benzole is quietly steady at 1s. 2d. to 1s. 3d. per gallon f.o.r. in buyers' rail tanks.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,, ...	1	2	,,	1	3	,, ,, ,,
Pure ,, ...	1	6	,,	1	7	,, ,, ,,

New Capital Issues.

Bognor Gas and Electricity Company.—The tenders for the £25,000 5½ p.ct. redeemable debenture stock, which Messrs. A. & W. Richards offered on behalf of the Directors of this Company, were opened on May 24. They amounted to a total of £139,000, ranging from £108 down to the minimum of £102 10s. per £100. The lowest accepted tender was at £105 per £100, and the average price obtained £105 10s. 2d.

Trade Notes.

Change of Address.

Messrs. Price, Stutfield, & Co., Ltd., announce that on June 1 they are moving to larger offices at Dominion House, 110, Fenchurch Street, London, E.C. 3. This change is necessitated by the steady growth of their business as sulphur and chemical merchants, and more especially by the rapid expansion of the department dealing with the "Acticarbone" process of solvent recovery by the use of the activated carbons of this trade mark.

Contracts Advertised To-Day.

Coal.

The Birstall Urban District Council invite tenders for the supply of gas coal. [Advert. on p. 537.]

The Dawlish Gas and Coke Company invite tenders for the supply of gas nuts. [Advert. on p. 537.]

The Dewsbury Gas Department invite tenders for the supply of coal. [Advert. on p. 537.]

The Hebden Bridge and Mytholmroyd Gas Board invite tenders for the supply of coal. [Advert. on p. 537.]

Gas Acts (1920 and 1929) Orders.

AMENDING ORDER.

Poulton-le-Fylde Urban District Council.

As from May 3, section 3 (maximum price) of the Poulton-le-Fylde Gas (Charges) Order, 1924, shall have effect as if the words "thirteen decimal eight" were substituted therein for the word "thirteen."

The pride of many modern kitchens

Modern taste demands in kitchen appointments something more than efficiency—an appearance of enduring charm. That is why the "Acme" "New World" possesses an irresistible appeal. Its beautiful porcelain enamelled finish, in a fine grey mottle, adds considerably to the appearance of the kitchen and is kept spotlessly clean with a minimum of care.

Add to this pleasing appearance the advantages of "New World" construction — the one burner oven with bottom-flue-outlet; the "Regulo" control, which takes the anxiety out of cooking; the convenience of the Disc-Bar hotplate; the "Rado" burners, which ensure complete combustion and gas economy—and it is evident why the "Acme" "New World" appeals to the practical commonsense of the consumer and takes pride of place in many well-arranged kitchens.

The
"ACME" "NEW WORLD" Gas Cooker
in the "Rado" Grey Mottled Enamel Finish

ARDEN HILL & CO.,
ACME WORKS, ASTON, BIRMINGHAM.

Radiation
PROPRIETORS

Humphreys & Glasgow Ltd.
Water-Gas

	Cu. Ft. Daily
Aarhus	800,000
Abertillery	500,000
Abertillery	100,000
Admiralty:	
British	800,000
British	800,000
British	800,000
Briti-h	800,000
British	800,000
French	800,000
French	800,000
Agram	200,000
Airdrie	434,000
Aldershot	1,400,000
Aldershot	1,000,000
Aldershot	1,316,000
Algiers	1,760,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amersfoort	300,000
Amsterdam	1,000,000
Amsterdam	1,000,000
Amsterdam	2,700,000
Amsterdam	1,350,000
Antwerp	1,500,000
Antwerp	1,000,000
Antwerp	1,500,000
Antwerp	1,900,000
Arundel	215,000
Ascot	423,000
Ashford	250,000
Augsburg	425,000
Aylesbury	150,000
Aylesbury	470,000
Banbury	200,000
Banff	125,000
Barmen	500,000
Barnsley	588,000
Barrow	300,000
Barrow	500,000
Barry	500,000
Barry	720,000
Bath	1,000,000
Bath	1,000,000
Bath	1,300,000
Bath	1,200,000
Bedford	1,000,000
Belfast	1,700,000
Belfast	4,500,000
Belfast	1,250,000
Belfast	1,250,000
Belfast	2,250,000
Benrath	125,000
Berkhampstead	259,000
Berlin:	
Charlottenb'g	2,500,000
Danziger Str.	1,630,000
Neukoelin	650,000
Neukoelin	700,000
Schnargendorf	760,000
Tegel	3,500,000
Tegel	6,350,000
Tegel	745,000
Berne, Switz.	725,000
Bexhill	400,000
Bideford	258,000
Bilston	375,000
Bilston	125,000
Birmingham:	
Adderley St.	675,000
Adderley St.	850,000
Nechells	3,000,000
Nechells	3,000,000
Nechells	3,000,000
Nechells	7,650,000
Swan Village	1,500,000
Windsor St.	3,000,000
Windsor St.	3,000,000
Windsor St.	6,100,000
Bishop's Stortford	200,000
Bishop's Stortford	300,000
Bishop's Stortford	200,000
Bishop's Stortford	300,000
Blackburn	1,190,000
Blantyre	150,000
Blois	125,000
Blois	125,000
Bochum	533,000
Bognor	100,000
Bognor	423,000
Bognor	500,000
Bo ness	125,000
Boulogne	340,000
Bournemouth	1,000,000
Bournemouth	500,000
Bournemouth	1,500,000
Bournemouth	1,000,000
Bournemouth	500,000
Bournemouth	1,533,000
Bournemouth	2,000,000
Bournemouth	500,000
Bournemouth	2,750,000
Bradford	1,250,000
Bremen	350,000
Bremen	950,000
Bremen	850,000
Brentwood	250,000
Brescia	588,000
Brescia	588,000
Brest	550,000
Bridgwater	200,000
Bridlington	150,000
Bridlington	200,000
Bridlington	550,000
Brieg	100,000
Brierley Hill	250,000
Brierley Hill	425,000
Brighton	1,750,000
Brighton	1,850,000
Brighton	750,000
Brighton	2,750,000
Brighton	3,000,000
Bristol	2,000,000
Bristol	2,500,000
Bristol	825,000
Bristol	825,000
Bristol	1,500,000
Bromley	1,500,000
Bruges	200,000
Bruges	600,000
Brussels:	
Anderlecht	350,000

	Cu. Ft. Daily
Brussels:	
Anderlecht	350,000
Forest	1,000,000
Forest	1,000,000
Forest	1,000,000
Forest	1,500,000
Forest	88,000
Kockelberg	1,000,000
St. Gilles	1,000,000
St. Josse	1,000,000
St. Josse	600,000
St. Josse	775,000
Ville	750,000
Ville	750,000
Ville	1,150,000
Ville	350,000
Bucarest	1,100,000
Buckie	164,000
Budapest	50,000
Budapest	1,750,000
Budapest	200,000
Budapest	250,000
Burnley	1,350,000
Caen	250,000
Cambridge	500,000
Cambridge	1,000,000
Cambridge	1,700,000
Cardiff	2,000,000
Cardiff	3,000,000
Cardiff	1,950,000
Cardiff	600,000
Carlisle	600,000
Carlsruhe	500,000
Carnarvon	348,000
Charleroi	1,250,000
Châteauroux	125,000
Châteauroux	125,000
Chatelet	500,000
Chester	564,000
Chesterfield	430,000
Chesterfield	90,000
Chesterton	197,000
Chichester	250,000
Chorley	300,000
Cie. des Compteurs	1,150,000
Cie. Lorraine de Ch.	210,000
Cie. Mines de Roche	585,000
Coatbridge	400,000
Commercial, L'n	850,000
Commercial	850,000
Commercial	1,250,000
Commercial	2,000,000
Commercial	800,000
Commercial	2,100,000
Copenhagen	700,000
Copenhagen	2,500,000
Copenhagen	1,750,000
Copenhagen	1,200,000
Courtrai	250,000
Coventry	600,000
Coventry	600,000
Coventry	800,000
Coventry	1,250,000
Coventry	350,000
Cowdenbeath	420,000
Cracow	200,000
Cracow	200,000
Cranleigh	188,000
Crefeld	500,000
Crewe	700,000
Crewe	800,000
Crosfield & Sons	1,500,000
Crosfield & Sons	1,500,000
Crowborough	150,000
Croydon	1,250,000
Croydon	625,000
Croydon	625,000
Croydon	550,000
Croydon	650,000
Croydon	1,125,000
Croydon	150,000
Croydon	3,000,000
Croydon	6,000,000
Deal	250,000
Deal	250,000
Debreczin	100,000
Derby	1,500,000
Derby	2,000,000
Deventer	150,000
Deventer	200,000
Devonport	1,600,000
Devonport	1,150,000
Doncaster	1,350,000
Dorking	150,000
Dorking	300,000
Dorking	130,000
Dover	500,000
Dover	300,000
Dublin	2,000,000
Dublin	2,000,000
Dublin	650,000
Dudley	600,000
Dundee	1,500,000
Dundee	1,650,000
Dundee	900,000
Dunedin, N.Z.	150,000
Dunedin	275,000
Durham	200,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Eastbourne	1,350,000
Edinburgh	2,000,000
Eindhoven	1,500,000
Electro-Chimie	650,000
Enschede	282,000
Epping	500,000
Epsom	225,000
Epsom	300,000
Essen	1,400,000
Essen-Borbeck	1,400,000
Exeter	1,100,000
Exeter	1,200,000
Exmouth	376,000
Falmouth	150,000
Falmouth	200,000
Farnham	300,000
Faversham	200,000
Flensburg	300,000
Flensburg	125,000
Fond. del Pignone	164,000
Forst	300,000
Frankenthal	175,000

	Cu. Ft. Daily
Fuel Research Wks.	500,000
Fuel Research Wks.	500,000
Furnes	500,000
Gabionz	140,000
Gas L. & C. Co.:	
Beckton	10,000,000
Beckton	7,000,000
Beckton	3,500,000
Beckton	7,000,000
Beckton	7,000,000
Beckton	5,250,000
Beckton	4,500,000
Beckton	3,000,000
Beckton	1,500,000
Bow Common	1,000,000
Bow Common	1,150,000
Bow Common	150,000
Brentford	1,200,000
Brentford	850,000
Brentford	350,000
Brentford	750,000
Brentford	6,000,000
Bromley	3,750,000
Bromley	2,250,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	1,450,000
Bromley	1,350,000
Fulham	2,500,000
Fulham	1,700,000
Grays	250,000
Grays	400,000
Grays	725,000
Ilford	650,000
Ilford	750,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Nine Elms	2,750,000
Nine Elms	750,000
Nine Elms	1,870,000
Nine Elms	2,850,000
Shoreditch	900,000
Shoreditch	2,700,000
Shoreditch	2,725,000
Southall	2,000,000
Southall	3,000,000
Staines	600,000
Stratford	1,700,000
Stratford	850,000
Stratford	2,350,000
Stratford	2,350,000
Gelsenkirchen	175,000
Gelsenkirchen	350,000
Geneva	500,000
Geneva	700,000
Geneva	1,270,000
Gennevilliers	10,600,000
Gennevilliers	2,900,000
Girvan	235,000
Glasgow	3,000,000
Glasgow	2,500,000
Glasgow	2,250,000
Glossop	340,000
Gloucester	800,000
Gloucester	1,000,000
Gosport	200,000
Gosport	225,000
Göteborg	300,000
Göteborg	525,000
Göteborg	1,000,000
Graudenz	200,000
Groningen, Holland	500,000
Groningen	1,250,000
Guest Keen & Piggotts, Ltd.	1,936,000
Guildford	300,000
Guildford	200,000
Guildford	350,000
Guildford	1,100,000
Guildford	150,000
Haarlem	850,000
Hamburg	1,750,000
Hampton Court	500,000
Hampton Court	600,000
Hampton Court	1,100,000
Hanley	800,000
Hanley	800,000
Hartlepool	750,000
Hartlepool	765,000
Hastings	1,250,000
Haywards Heath	470,000
Hebden Bridge	200,000
Heidelberg	200,000
Hereford	525,000
Hertford	197,000
Hertford	244,000
Hessle	150,000
Heywood	500,000
High Wycombe	752,000
Hilversum	850,000
Hilversum	1,000,000
Hinckley	250,000
Holyhead	197,000
Hong Kong	450,000
Hong Kong	450,000
Hornsey	1,000,000
Hornsey	1,000,000
Hornsey	750,000
Hornsey	750,000
Horsham	235,000
Hull	1,500,000
Hull	1,000,000
Hull	1,600,000
Innsbruck	200,000
Ipswich	750,000
Ipswich	1,250,000
Ipswich	600,000
Jersey	564,000
Jersey	564,000
Kampen	350,000
Karlsbad	350,000
Kendal	329,000
Kidsgrove	235,000
Kiel	1,000,000
Kiel	880,000
Kilmarnock	500,000
Kilmarnock	585,000
King's Lynn	197,000
King's Lynn	400,000
Kingston-on-Th.	3,400,000
Kirkintilloch	300,000

	Cu. Ft. Daily
Kirkintilloch	827,000
Kolozvar	100,000
Lancaster	500,000
Langley Mill	500,000
Largs	235,000
Lausanne	250,000
Lausanne	385,000
Lausanne	970,000
Le Mans	420,000
Lea Bridge	350,000
Lea Bridge	350,000
Lea Bridge	400,000
Lea Bridge	1,000,000
Lea Bridge	1,500,000
Lea Bridge	1,530,000
Leamington	600,000
Leamington	525,000
Leatherhead	705,000
Leeds	1,500,000
Leeuwarden	400,000
Leiden	500,000
Leiden	575,000
Leigh	350,000
Lemberg	260,000
Lemberg	500,000
Letchworth	362,000
Letchworth	423,000
Liége	1,000,000
Liége	750,000
Lille	860,000
Lincoln	500,000
Lincoln	833,000
Littlehampton	500,000
Liverpool	3,500,000
Liverpool	4,500,000
Liverpool	750,000
Liverpool	1,750,000
Liverpool	1,250,000
Liverpool	3,000,000
Liverpool	1,500,000
Liverpool	1,250,000
Liverpool	2,350,000
Liverpool	3,000,000
Liverpool	8,600,000
Long Eaton	430,000
Long Eaton	170,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Luton	300,000
Maastricht	200,000
Macclesfield	800,000
Magdeburg	1,400,000
Maidenhead	225,000
Maidenhead	225,000
Maidenhead	175,000
Maidenhead	175,000
Maidenhead	200,000
Maidenhead	200,000
Maidstone	500,000
Maidstone	500,000
Malines	500,000
Malines	575,000
Malmö	350,000
Malta	400,090
Manchester	3,500,000
Manchester	3,500,000
Manchester	1,500,000
Mansfield	330,000
Mansfield	433,000
Margate	960,000
Marlborough	100,000
Mayence	700,000
Melbourne	5,000,000
Merthyr Tydfil	300,000
Merthyr Tydfil	200,000
Middlesbrough	1,250,000
Middlesbrough	750,000
Middlesbrough	900,000
M/M. Woolston	9,000,000
Minehead	300,000
Monaco	275,000
Monaco	618,000
Monaco	618,000
Monaco	400,000
Complete Gasification.	
Mons	600,000
Montevideo	1,222,000
Morecambe	333,000
Moscow	1,000,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	350,000
Neuchâtel, Switz.	250,000
Neuss	140,000
Newbury	250,000
Newcastle	2,500,000
Newcastle, N.S.W.	500,000
Newhaven	235,000
Newport Pagnell	188,000
Nice	700,000
Nice	1,295,000
Nictheroy	250,000
Nimes	420,000
North Middlesex	200,000
North Middlesex	200,000
North Middlesex	1,000,000
North Middlesex	1,600,000
North Middlesex	800,000
Complete Gasification.	
North Middlesex	900,000
2nd Complete Gasification.	
North Sydney	500,000
North Sydney	500,000
Norwich	1,000,000
Norwich	300,000
Norwich	1,500,000
Nottingham	1,000,000
Nottingham	1,000,000
Nuneaton	125,000
Oberhausen	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	100,000
Ostend	200,000
" Zandvoorde	700,000
Oxford	4,500,000
Palermo	968,000

	Cu. Ft. Daily
Palermo	850,000
Paris:	
Clichy	4,000,000
Ivry	2,355,000
Landy	6,000,000
Landy	6,000,000
Landy	5,295,000
La Villette	4,000,000
La Villette	2,000,000
La Villette	2,000,000
Paris-Plage	125,000
Pau	550,000
Pavie	194,000
Pavie	212 000
Pembroke	240,000
Perigueux	350,000
Perth, W.A.	125,000
Perth, W.A.	1,000,000
Petone, N.Z.	200,000
Piggott & Co.	1,500,000
Plymouth	2,000,000
Poitiers	350,000
Pontypool	120,000
Port Elizabeth	400,000
Portsmouth	1,000,000
Portsmouth	2,000,000
Portsmouth	800,000
Portsmouth	2,000,000
Posen	450,000
Posen	700,000
Prague	140,000
Preston	1,400,000
Ramsgate	430,000
Reading	1,000,000
Reading	1,000,000
Reading	600,000
Redditch	500,000
Redhill	275,000
Redhill	300,000
Redhill	1,100,000
Redhill	625,000
Reichenberg	200,000
Reichenberg	200,000
Reval	350,000
Rhymney	175,000
Rhymney	250,000
Riddings	258,000
Ripley	120,000
Rochester	2,200,000
Rochester	2,800,000
Romford	300,000
Romford	350 000
Romford	1,200,000
Rotterdam	850,000
Rotterdam	1,500,000
Rotterdam	750,000
Rotterdam	750,000
Rotterdam	600,000
Rotterdam	2,000,000
Rotterdam	500,000
Royston (Yorks.)	250,000
Rugby	1,000,000
Rugby	450,000
Rushden	425,000
Rushden	517,000
Ryde	500,000
Saffron Walden	235,000
St. Albans	700,000
St. Albans	580,000
St. Albans	1,500,000
St. Andrews	210,000
St. Andrews	409,000
St. Gallen	225,000
St. Gallen	225,000
Sté. Ch.Gr. Paroisse	1,320,000
Sté Ch Gr Paroisse	2 900,000
Sté I. & F. de Lens	1,130,000
Sté. Kuhlmann	1,270,000
Sté. Kuhlmann	3,200,000
Sté. Kuhlmann	2,150,000
Sté. Tubes Meuse	545,000
San Paulo	700,000
Scarborough	800,000
Scarborough	200,000
Scarborough	350,000
Scarborough	1,300,000
Scarborough	1,350,000
Seaford	200,000
Shanghai	225,000
Shanghai	225,000
Shanghai	1,600,000
Shanklin	259,000
Shanklin	400,000
Sheerness	200,000
Sheerness	180,000
Sheerness	200,000
Sheerness	220,000
Sheffield	1,530,000
Sheffield	3,000,000
" Steel Prods.	3,000,000
Shirebrook	500,000
Shrewsbury	300,000
Shrewsbury	170,000
Sidmouth	225,000
Singapore	600,000
Sittingbourne	259,000
Southampton	800,000
Southampton	500,000
Southampton	600,000
Southampton	100,000
Southampton	1,000,000
Southampton	1,450,000
Southend	1,250,000
Southend	900,000
Southend	900,000
Southend	600,000
Southgate	400,000
Southgate	500,000
Southgate	800,000
Southgate	500,000
Southport	750,000
Southport	900,000
Southport	900,000
Southport	450,000
South Shields	650,000
South Shields	1,250,000
Stafford	500,000
Stettin	880,000
Stirling	400,000
Stirling	970,000
Stockholm	1,500,000
Stockholm	1,750,000
Stockport	600,000

	Cu. Ft. Daily
Stockport	600,000
Stockport	400,000
Stockport	400,000
Stockton	400,000
Stockton	250,000
Stourbridge	500,000
Stourbridge	500 000
Sunderland	2,250,000
Sunderland	300,000
Sutton	1,269,000
Sutton	1,625,000
Swanage	300,000
Swansea	750,000
Swansea	1,000,000
Swansea	450,000
Swansea	1,250,000
Swansea	2,000,000
Swindon	300,000
Swindon	450,000
Swindon	400,000
Sydney	1,000,000
Sydney	1 000,000
Sydney	1,000,000
Sydney	1,000 000
Sydney	8,250,000
Taunton	225 000
Taunton	350,000
Tawe Valley	275,000
Teignmouth	300 000
The Hague	1,000,000
The Hague	500,000
The Hague	1,750,000
The Hague	1,500,000
The Hague	775,000
The Hague	1,500,000
The Hague	2,930,000
Tilburg	400,000
Tirlemont	125,000
Tokyo	2,000,000
Torquay	350,000
Torquay	350,000
Torquay	320,000
Tottenham	750,000
Tottenham	750,000
Tottenham	350,000
Tottenham	1,000,000
Tottenham	1,000,000
Tottenham	1,250,000
Tottenham	2,500,000
Tottenham	1,000,000
Tottenham	500,000
Tottenham	1,000,000
Toulouse	1,800,000
Toulouse	785,000
ToulouseNatl. Wks.	2,400,000
ToulouseNatl. Wks.	6,200,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Trowbridge	150,000
Tunbridge Wells	1,000,000
Tunbridge Wells	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Tynemouth	1,100,000
Ulm	400,000
Union Chim.-Belge	1,977,000
Utrecht	1,000,000
Utrecht	1,000,000
Uxbridge	752,000
Uxbridge	1,000,000
Vancouver	3,800,000
Verviers	1,000,000
Vevey, Switz.	650,000
Victoria, B.C.	500,000
Vienna	3,500,000
Vienna	2,500,000
Walsall	750,000
Walsall	375,000
Waltham	400,000
Waltham	140,000
Walton-on-Thames	970,000
Wandsbek	125,000
Wandsworth	1,800,000
Wandsworth	4,230,000
Wanganui, N.Z.	376,000
Ware	150,000
Ware	282,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford	350,000
Watford	400,000
Watford	1,250,000
Wath	430,000
Weimar	100,000
Wellingborough	525,000
Wellingborough	525,000
Wellingborough	350,000
Wellington, N.Z.	350,000
Wellington	300,000
West Bromwich	550,000
Westgate	250,000
Weston-Mare	350,000
Weston-Mare	350,000
Weston-Mare	150,000
Weston-Mare	500,000
Wexford	100,000
Weymouth	400,000
Weymouth	100,000
Weymouth	658,000
Whitstable	423,000
Widnes	500,000
Wiesbaden	850,000
Wigston	250,000
Winchester	225,000
Winchester	125,000
Winchester	410,000
Winchester	325,000
Woking	400,000
Wolverhampton	1,500,000
Wolverhampton	1,000,000
Wolverhampton	250,000
Wolverhampton	400,000
Worthing	525,000
Yarmouth	500,000
Yarmouth	125,000
Yeovil	340,000
Zwolle	200,000
Zwolle	200,000
Zwolle	700,000

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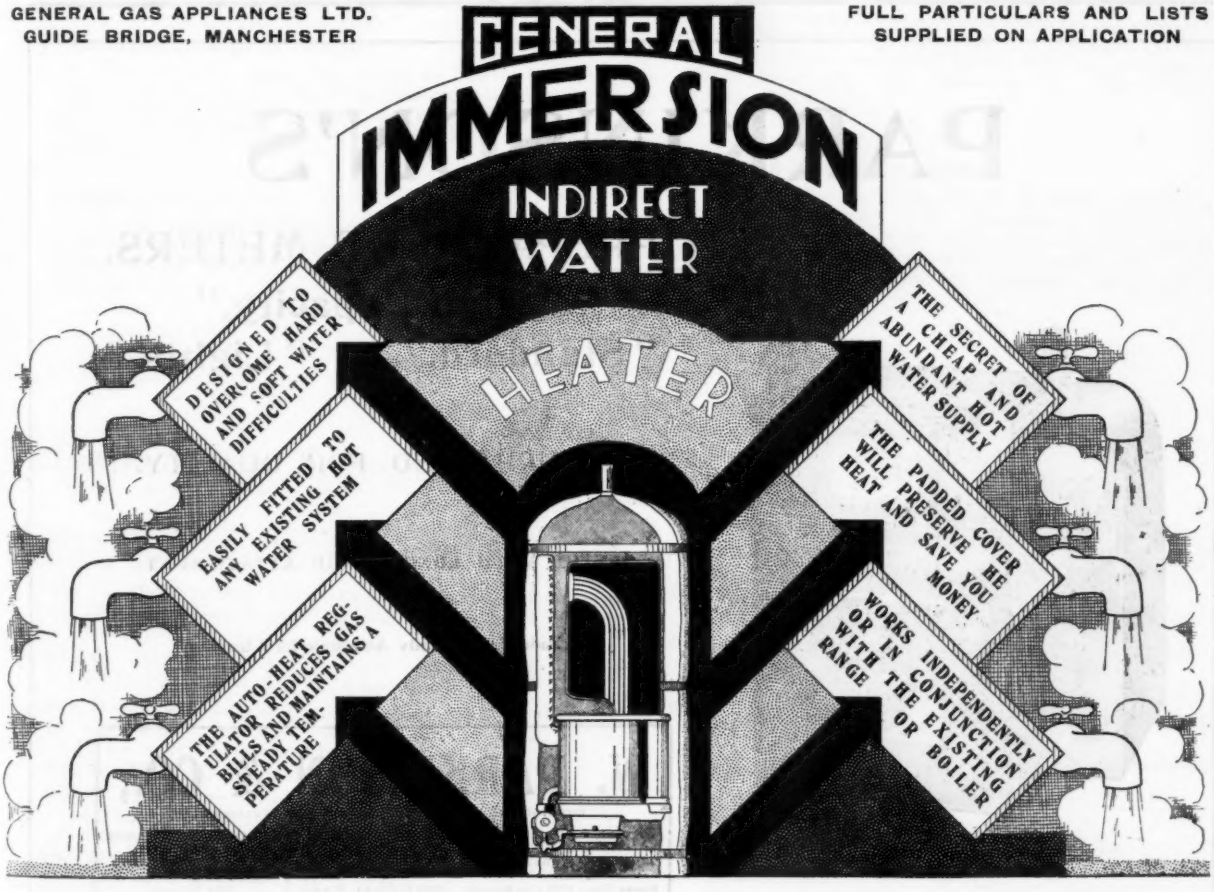
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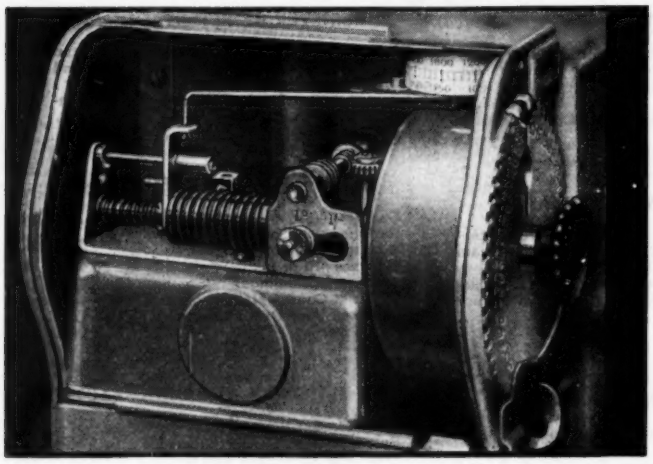

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